THE IRON TRADE REVIEW

Volume XLI CLEVELAND, JULY 11, 1907 Number 2

HEAVY PRODUCTION

BY BLAST FURNACES DURING THE PAST MONTH.

Increased Number of Stacks.—Pig Iron Market Quiet.—Heavy Business in Finished Products Pending.

Our monthly blast furnace statistics show that the production for June was 2,237,420 tons against 2,291,030 tons in May. As June had only 30 days, the daily production for that month was somewhat larger than for May. July starts with 12 more stacks in blast than were in operation on the first day of June, and the outlook is that the production will be well maintained, although furnaces are not expected to do so well during the extremely hot weather as when weather conditions are more favorable. There is considerable complaint on the part of furnace men that ore this year is not coming up to its guarantee or iron content, often being short from four to five per cent. This condition is attributed not only to the tendency of Lake Superior ores toward lower iron content, but also to the fact that with the new system of ore sampling introduced this year, much more nearly correct analyses of cargoes are being obtained.

Improved Deliveries

In finished lines the volume of new business continues small, although some orders of good size have been taken for steel bars. The mills are gradually catching up on deliveries, especially on plates and sheets. The Carnegie Steel Co. during the past 60 days has taken orders for about 100,000 tons of steel rails, mostly for delivery this year. An agreement as to specifications for rails for 1908 delivery will not be reached for at least two months, and during that period very few orders will be placed.

Pig Iron Very Dull.

Extreme quiet prevails in the pig iron market, neither buyers nor sellers being active. The only transaction worthy of note in the Pittsburg district was a trade involving about 9,000 tons of Bessemer and basic made in change for steel on a basis of about $23 for the iron at the furnace. Prevailing prices for spot iron are practically the same as for future delivery.

Heavy Orders Are Pending

A large number of orders for structural material are pending at Chicago, including 8,000 tons for highway bridges, 15,000 tons for office buildings, and from 15,000 to 20,000 tons for railroads. The leading producer is sold up for the year on plates, but independent interests are taking orders and giving fair delivery. Shipbuilding companies are specifying heavily on material for new vessels. The demand of agricultural interests for wire continues unabated.

Crude Steel Demand

The supply of crude steel is not yet adequate, especially in the Pittsburg district, in spite of the fact that some 50,000 tons have been sold by producers who are not usually sellers. The production of open-hearth steel will be largely increased in that district when the new Talbot furnaces planned or under construction are completed.

BREAK IN COPPER.

(Special Telegram.)

New York, July 10.—The long expected break in the official price of copper came yesterday when the leading producers began taking business in electrolytic at 22 cents with lake and casting fractionally higher and lower respectively. This is about the level of the actual selling price prevailing for some weeks back.

STILL GAINING

On Last Year's Shipments of Ore at Head of Lakes.—Vessel Shortage.

(Special Telegram.)

Duluth, Minn., July 9.—Despite the holiday, the past week did not fall behind in the shipment of ore. The Allouez docks were badly handicapped during the most of the week because there were absolutely no boats there. Shortage of boats is almost a threadbare complaint, but certainly 75,000 tons more could be shipped weekly from Allouez if the boat tonnage was available. On Tuesday the Duluth docks had a tremendous day, shipping 126,085 tons, and it was the work there that kept the total from the head of the lake about the million mark, as the Two Harbors' shipment fell off somewhat. At Ashland, the ore shipments are still about a week behind those of last year, though, remembering the later beginning, that means an increase of about 140,000 tons a week is being loaded and the season's shipment up to July was 1,049,357 tons. The Minnesota shipments for the week were as follows: Duluth, 515,429 tons; Two Harbors, 277,283 tons, and Superior, 258,767 tons, a total of 1,051,479, or 237,514 tons more than a year ago. Fogs have delayed traffic to a considerable degree and there has been more stranding than ordinary among the big boats, as instanced by the Earling, Phipps and Walsh.

HIGH QUALITY RAILS SOLD TO TWO LINES.

(Special Telegram.)

New York, July 10.—The Bethlehem Steel Co. announces the sale of 10,000 tons of open-hearth rails to the Lackawanna and 25,000 to the Santa Fe. These are premium, high quality rails for next year's delivery with 25 per cent discard and running under 0.04 in phosphorus. Corporation rail sales for the week aggregate about 7,000 tons.

No. 3 Middlesbrough opened today at 57 shillings.

THE WEEK IN IRON CENTERS

PITTSBURG.

Pig Iron Dull.—Very Heavy Specifications in Finished Lines.

Office of THE IRON TRADE REVIEW,
521 Park Bldg., July 10.

The midsummer quiet is on in earnest and with the exception of a few of the finished lines, particularly steel bars, but very little new buying is being done. In pig iron the summary of the business in the district during the week under review may truthfully be confined to one transaction in the nature of a trade deal, involving a little over 9,000 tons of pig iron, about equally divided Bessemer and basic in exchange for steel. Spot pig iron prices are almost entirely eliminated and quotations for prompt delivery and for shipments over the last half are made at about the same figure. The largest volume of business in finished lines is on steel bars and the three large producers in the Pittsburg district each took on a heavy tonnage. There were a few large transactions included in this tonnage, but the majority of them were in smaller lots, well distributed. The structural business has improved and there is a good demand for the heavy shapes. Specifications on all finished lines are extremely heavy and on steel bars and plates are unprecedented. The leading interest states that during the past 60 days it has closed for practically 100,000 tons of standard rails, most of which were for delivery over the remainder of the present year. The volume of 1908 rail business has been very light on account of no agreement having been reached on specifications for this delivery. The manufacturers of merchant pipe and boiler tubes have more business on their books at the opening of the last half of the year than ever before in their history and independent producers, as well as the leading interest, are booked practically to capacity for a period extending from four to five months. The Susquehanna Co. has resumed operation after its recent troubles and is in position to make prompt deliveries, for a short time at least. A shortage in steel, which has been noticed for the past three or four months, is still very much in evidence. Although over 50,000 tons has been sold by producers who usually are not sellers, this material has been consumed without affecting prices in any way. The Jones & Laughlin Steel Co. has broken ground at its South Side plant for the erection of four new Talbot open-hearth furnaces, each with a daily capacity of 200 tons. These four furnaces will be on the up-river side of the present battery of open-hearth furnaces and will make a total of nine 200-ton Talbots at this plant without taking into consideration the six new Talbots planned for the new Allequippa works of this company. The report that the Eastern Steel Co., Pottsville, had temporarily suspended operations was without foundation, as the plant is in full operation in all departments.

Pig Iron.—There has been little or nothing doing in pig iron during the week under review, and the only transaction of passing interest was a trade deal involving the exchange of about 9,000 tons of pig iron, about equally divided, Bessemer and basic, both on a basis of $23, at the furnace, which is considered as about the market, extending over the next four months. It has been reported that there is still a considerable tonnage of resale Milliken Bros. basic which has not been disposed of and that it had been offered on a basis of $21 furnace, but this has not been verified. The inquiry for foundry iron is extremely light and spot prices have practically disappeared on all grades of pig iron. Last half and spot prices are about equal. A decided tendency to wait until about Sept. 1 before closing for next year has developed and the sentiment is gaining ground that nothing can be gained by going into the market at this time, especially inasmuch as consumers are covered for the remainder of the year. The Pittsburg Steel Co. will be a very large new buyer after the first of the year and it is understood it is in a receptive mood and waiting for a shading of present quotations before buying. The two new furnaces of the Carnegie Steel Co., at Duquesne are being rushed to completion and the first is expected to be ready some time in October. Jones & Laughlin's first furnace at Alliquippa will be ready about the first of the year and No. 8 Carrie furnace at Edgar Thomson plant of Carnegie Steel Co., will be blown in within a month or six weeks. Northern No. 2 foundry for prompt shipment is quoted $23.50 valley and for the remainder of the year the same. Basic pig iron has shown an inclination to decline in price and we now quote $22.75 to $23.25 for prompt and the remainder of the year. On last half deliveries we quote as follows:

Bessemer, Valley	$23.00 to 23.25
Bessemer, Pittsburg	23.90 to 24.15
No. 1 Foundry, Pittsburg	24.90 to 25.40
No. 2 Foundry, Pittsburg	23.90 to 24.40
Gray Forge, Pittsburg	23.40 to 23.90
Basic, Valley	22.75 to 23.25
Basic, Pittsburg	23.65 to 24.15

Ferro-Manganese.—Inquiry for ferro-manganese and ferro-silicon has shown some little improvement during the past week and there is a tendency toward higher prices for last quarter delivery. For prompt shipment, ferro-manganese, foreign 80 per cent, we quote $63 to $64 delivered Pittsburg, and for fourth quarter $62 to $63.

Imported 50 per cent ferro-silicon is quoted $100 to $110 Pittsburg, domestic 12 per cent, $36; 11 per cent, $35; 10 per cent, $34. The lower grades of imported ferro-silicon are quoted $1 lower. These quotations are applicable to Pittsburg territory. Western and central western prices, where the material is not subject to the competition of foreign grades are higher and in the east a little lower.

Plates.—The Carnegie Steel Co. has taken on a contract for material for another steel steamer for the lakes. This will be built by the American Ship Building Co. and makes a total of five for 1908 delivery by this company for which material has already been contracted. Plate specifications are extremely heavy although the volume of new business has not improved, this being due to the filled up condition of the mills and inability to make anything like prompt delivery as far as the larger interests are concerned. The miscellaneous small business is being taken on by the smaller plants, but as far as can be learned very few premiums are being asked. There is a large contract pending for new steel car equipment and the outlook is that it will be closed before the end of the present week. We quote as follows:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.80c to 1.90c f. o. b. mill Pittsburg for prompt shipment, and 1.70c base Pittsburg on future deliveries. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c. A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches,

0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gages under ¼-inch to and including 3-16-inch plate on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—While the volume of new business is comparatively light, specifications are correspondingly heavy, particularly on galvanized and blue annealed. Delivery promises on new business for this class of material by the leading interest extend from 16 to 18 weeks. We quote as follows:

Black steel sheets, one pass, cold rolled, Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvanized Nos. 10-11, 2.65c; Nos. 12-14, 2.75c; Nos. 15-16, 2.85c; Nos. 17-21, 3.00c; Nos. 22-24, 3.15c; Nos. 25-26, 3.35c; No. 27, 3.55c; No. 28, 3.75c; No. 29, 4.00c; No. 30, 4.25c; blue annealed, No. 10 and heavier, 1.85c; Nos. 11-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2.05c. Corrugated roofing, $1.90c per square for No. 28 painted, 2½-inch corrugation, and galvanized, $3.25 per square for No. 28.

Tin Plate.—Specifications for tin plate have shown a very decided improvement from week to week during the past month and with the continued warm weather reports that crops have not been materially injured, specifications are running normal for this time of the year. Specifications on tin plate for uses by other than the canning interests are being received by the mills in very satisfactory volume.

Coke tin plate 100-pound basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less 2 per cent for cash in ten days.

Rails and Track Material.—Pending negotiations in regard to the 1908 rail specifications, the new standard rail tonnage for the week has been practically nothing, although the Carnegie Steel Co. announces that during the past two months it has closed for 100,000 tons of standard rails, most of which were for 1907 delivery. The demand for light rails has been very brisk and the leading interest closed during the week for about 1,500 tons. For 1907-08 delivery under the old specifications we quote as follows:

Fifty pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $40; 12-pound, $36 to $37; 16-pound, $35 to $36; 20-pound, $34 to $35; 25 to 45-pound, $33 to $34; angle splice bars for standard sections, $1.65; standard spikes for forward deliveries, $2.30 to $2.35 Pittsburg; hand spikes, $2.50 Pittsburg.

Hoops, Bands and Cotton Ties.—This market is quiet as far as new business is concerned, but specifications against existing obligations are heavy. We continue to quote:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c, base half extras as per standard steel. Cotton ties, 96c per bundle.

Steel.—Despite the fact that a large tonnage, estimated to be over 50,000 tons of semi-finished material has been sold from unusual sources within the past few weeks, it has apparently had no bad effect on the market and we continue to quote $30 to $30.50 mill on soft Bessemer billets, 4 x 4 and larger and $31.50 to $32 on open-hearth. Sheet bars are quoted nominally at $31, mills, Pittsburg or Youngstown. The Republic Iron & Steel Co. is out of the market on billets and sheet bars for the remainder of the year, the Jones & Laughlin Steel Co. is not a seller and has not been except under unusual circumstances and the Corporation is not taking on any new contracts for semi-finished material, although the notification by the Pittsburg Steel Co., of its intention to discontinue its five-year contract may have some effect in giving the leading interest additional supply after Jan. 1.

Merchant Bars.—Iron and bar business has been moving along nicely and in better volume than is usual at this time of the year. The market is in good shape, and steady, and we quote 1.75c to 1.80c for delivery in the Pittsburg district and 1.60c Pittsburg plus freight to point of delivery for western shipment. The steel bar specifications are unprecedented in volume, and the new business for the past week has been as heavy as during any week in the past two months, not discounting the contract period of the agricultural implement interests. This new business has been well distributed and includes half a dozen very fair sized tonnages. Practically all of the agricultural implement contracts have been closed and a review of the estimated requirements, taken contract for contract, shows them heavier all along the line than they were last year. We quote as follows:

Common iron bars, 1.75c to 1.80c Pittsburg in carload lots and over, 1.80c to 1.85c in less than carloads; Bessemer steel bars, 1.60c, net for future deliveries; 1.85c to 1.90c out of stock; plow and cultivator, 1.60c, net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30 advance. Cold rolled and ground shafting, 50 per cent off in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. The price of planished and machine straightened tire is 1.80c; base, half tire extras. Iron finished tire up to 1½ inch and over to be sold on regular bar basis of 1.60c base, half extras, steel card.

Structural Material.—The McClintic-Marshall Construction Co. during the week took on 1,700 tons of bridge work for the Chicago, Milwaukee & St. Paul R. R., as well as the new construction work for additions to the plants of the Youngstown Sheet & Tube Co., Youngstown, O., and the Jeffrey Mfg. & Machine Co., Columbus, O. The new business placed with construction companies and the American Bridge Co. was heavier the past week than for some time past and a large part of it came from railroads. There is no indication that railroads are retrenching in any way or curtailing new construction and improvements. The improvements in conditions as they relate to new business placed with the mills is particularly reflected in the increased demand for heavy shapes. Deliveries have been delayed on account of inability to supply the necessary plates for the regular run of structural work.

Beams and channels, 15-inch, and under, 1.70c over 15 inches, 1.80c; zees, 1.70c; tees 1.70c; angles from three to six inches inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.80c base.

Wire and Wire Nails.—The manufacturers of wire products are beginning to catch their breaths after the exceedingly strenuous spring and early summer business, are making better deliveries and after the short summer shut-down for necessary repairs will endeavor to accumulate stocks in anticipation of a renewal of the heavy buying movement. We continue to quote:

Wire nails, jobbers' carload lots, $2; retailers' carload lots, $2.05; less than carload, $2.10; painted barb wire, $2.15, for jobbers in carloads; retailers in carloads, $2.20; and less than carload, $2.30, with 30c for galvaniz-

ing; plain wire, $1.85 for jobbers, and $1.90 by carload.

Merchant Pipe.—The Philadelphia Co. and the Barnsdall interests have each placed contracts during the week for ten miles of 1½-inch to 2-inch merchant pipe and several inquiries are pending, although none of them are large. As far as can be learned, there has been no large line pipe inquiry in the market since the contract for the line from West Virginia to Cincinnati was placed three weeks ago. The La Belle Iron Works, Steubenville, O., the Youngstown Sheet & Tube Co., Youngstown, and the National Tube Co. are making no specific delivery promises and the total tonnage on their books July 1 is estimated about 450,000 tons. We quote the following consumers' discounts subject to one point and five to jobbers in large lots:

	—Steel— Black.	Galv.
⅛ and ¼ inch	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches	73	63
7 to 12 inches	70	55
EXTRA STRONG PLAIN ENDS.		
⅛ to ⅜ inch	58	46
½ to 4 inches	65	53
4½ to 8 inches	61	49
DOUBLE EXTRA STRONG PLAIN ENDS.		
⅛ to 8 inches	54	43

Iron Pipe.—The Susquehanna Iron & Steel Co., which has been shut down for a considerable period, has again resumed operations and is manufacturing iron pipe. The producers in the district are crowded to the limit with present contract obligations and in most instances are refusing to quote on inquiries requiring definite delivery promises. We quote discounts as follows:

RANDOM LENGTHS WITH THREADS AND COUPLINGS—CARLOAD LOTS.	Black.	Galv.
⅛, ¼ and ⅜ inch	59	43
½ inch	62	51
¾ and 6 inch	67	57
7 and 8 inch	62	46
PLUGGED AND REAMED.		
1 to 4 inch	65	55
EXTRA STRONG PLAIN ENDS.		
⅛, ¼ and ⅜ inch	52	40
½ to 4 inch, inc	59	47
4½ to 8 inch	55	42
DOUBLE EXTRA HEAVY PLAIN ENDS.		
¼ to 3 inch, inc	48	37

Boiler Tubes.—It is a little early for the large consumers of boiler tubes, particularly locomotive builders, to place their contracts for last half requirements but it is expected that they will all be in before Aug. 1. The leading interest has decided to make no change in its policy regarding contracts. We quote:

	Iron.	Steel.
1 to 1½ inch	42	47
1¾ to 2¼ inch	42	59
2½ inch	47	61
2¾ to 5 inch	52	65
6 to 13 inch	42	59

2¼ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Coke.—The coke market has been very quiet since last week and on account of the heavy shipments made to furnaces in anticipation of decreased coke production due to the holiday and Sunday, a few of the large consumers have asked for temporary suspensions on shipment until the surplus has been consumed. There has been little or no inquiry for furnace coke, but prices are firm on both spot and last half coke. Spot furnace coke is quoted $2.35 to $2.50 and for last half, depending upon the grade, $2.50 to $2.60. There has been a little inquiry for foundry coke, but this has come from widely separated points and for small tonnages. Indications are that a large part of the foundry trade has covered either for the remainder of the year or for the year beginning July 1. A few sales of last half foundry coke are reported as low as $2.95 at the oven, but on standard Connellsville grades we quote $3.00 to $3.25 for spot and $3.15 to $3.30 at the oven for extended deliveries. On account of the successful plans of many of the operators in the region of inducing their men to work July 4, the production was not curtailed to the extent anticipated before the holiday, although the official figures will undoubtedly show a material reduction.

Old Material.—The scrap market is quiet. Mills are taking inventory and for this reason have not been buying. A quiet period is expected during July and August with probably slightly lower prices. The large consumers of scrap are expected to come into the market again before Sept. 1, when last quarter activities will begin. For delivery in the Pittsburg district, gross tons, we quote:

Heavy melting scrap, $18 to $18.50; re-rolling rails, $18.50 to $18.75; bundled sheet scrap, $16 to $16.50; iron axles, $31 to $31.50; old iron rails, $22.50 to $23; No. 1 wrought scrap, $18.50 to $18.75; old car wheels, $24 to 24.50; low phosphorus scrap, $23 to $23.50; machine shop turnings, $15 to $15.60; axle turnings, $15.50 to $15.75; cast borings, $13.50 to $14; No. 1 cast scrap, $21 to $21.50.

CHICAGO

Negotiations for Heavy Requirements Pending—Pig Iron Dull.

Office of THE IRON TRADE REVIEW.,
1362 Monadnock Block, July 9.

Negotiations are pending with local jobbing interests for their semi-annual requirements in rolled materials. Six thousand tons of plates have been let by one interest, and a contract for 10,000 to 20,000 tons of structural shapes is expected before the close of the week. These transactions, together with the purchase of 30,000 tons of open-hearth rails by the Santa Fe from the Bethlehem Steel Co., constitute the main developments of the market for the current week. Other rail purchases have been made, chief among the minor transactions being an order for 5,000 tons for a southwestern road for this year's delivery placed with the Lackawanna Steel Co. An unusually large number of railroad and building projects, involving fabricated material, have come up for figures. Highway bridges aggregate 8,000 to 9,000 tons; office buildings, 15,000 tons, and railroad bridges from 10,000 to 20,000 tons. The new Chicago city hall, the plans for which are being pushed, will require not less than 10,000 tons, and the LaSalle Hotel to be erected in this city, which is also certain to go through, will take another 7,000 tons. Three new depots are to be erected in Chicago and though contracts for them are in the remote distance, their aggregate steel requirements will be enormously heavy. There is no midsummer dullness, except in spots. Specifications for steel bars are the heaviest in history for this time of year, and the indications are that the new contracts will be consumed in their entirety despite the fact that fully 90 per cent showed an increase in tonnage purchased of 10 to 15 per cent above the minimum of contracts placed a year ago. Bar iron is dull, all the middle western mills being closed down for summer repairs. Shading continues in hard steel, and some irregularity also exists in quotations on shafting. Spikes, too, have declined in price. Specifications for sheets, plates and tubular goods are to the full capacity of mills. New tonnage in all is light, because of the wide gap in deliveries. Scrap has been further weakened by the large offerings of railroads, these aggregating this week nearly 17,000 tons.

Pig Iron.—Nothing of importance or significance has developed in the past week. Business continues light, deliveries are good, and the melt is unprecedentedly heavy. The latter feature constitutes the most interesting phase of the market, and it remains the sole support of the present level of prices. Foundrymen are not only receiving all the metal shipped, an indication that there is no stoppage of orders, but are constantly pressing producers to hasten their contract quotas or to anticipate deliveries. The elimination of spot prices was the natural expectation after the improvement in deliveries, and their removal has but lightly affected the regular schedules. A desirable order for southern iron providing for deliveries through the entire second half might be placed at the flat price of $21.00 Birmingham for No. 2, because of the dull con-

ditions prevailing, but otherwise the market is unchanged at $21.50 for the third quarter, and $20 for the fourth quarter. For the same reason, northern furnaces would take a similar order at the flat price of $25 Chicago for No. 2, but for shorter deliveries they are asking from $25 to $25.50 Chicago, and in some cases $26. Gray forge has declined sharply, but this is accounted for by the slump in scrap. It can now be purchased at a spread of $18 to $18.50 Birmingham, according to the delivery required. Silvery irons are in fair demand, but without change in price. Lake Superior charcoal for quick shipment has moved up to $27.25 Chicago. The maximum quotations below are for the third quarter; the minimum for the fourth quarter:

Lake Superior Charcoal	$27.25 to 27.75
Northern Foundry No. 1	25.50 to 26.00
Northern Foundry No. 2	25.00 to 25.50
Northern Foundry No. 3	24.50 to 25.00
Northern Scotch Foundry	25.50 to 26.00
Southern Foundry No. 1	24.85 to 26.35
Southern Foundry No. 2	24.35 to 25.85
Southern Foundry No. 3	23.85 to 25.35
Southern Foundry No. 4	22.85 to 24.35
Southern No. 1 Soft	24.85 to 26.35
Southern No. 2 Soft	24.35 to 25.85
Southern Gray Forge	22.35 to 22.85
Southern Mottled	21.85 to 22.35
Southern Silveries, 4 per cent silicon	25.85 to 27.35
Southern Silveries, 5 per cent silicon	26.85 to 28.35
Southern Silveries, 6 per cent silicon	27.85 to 29.85
Jackson Co. Silveries, 6 per cent	29.40 to 29.90
Jackson Co. Silveries, 8 per cent	30.40 to 30.90
Jackson Co. Silveries, 10 per cent	31.40 to 31.90
Malleable Bessemer	25.00 to 25.50

Billets and Rods.—The inquiry for crude steel continues fairly active. No large tonnages have been closed, nor are any pending, but carload orders are frequent. Bessemer rolling billets and sheet bars are offered at $31 Pittsburg; wire rods $37 to $38 Pittsburg; and forging billets at $36 to $38 Chicago, according to tonnage.

Merchant Bars.—The summer shutdown of bar iron mills is very extensive this year. The plants now idle include the East Chicago mills of the Interstate Iron & Steel Co., and Republic Iron & Steel Co.; Highlands Iron & Steel Co., Terre Haute, Ind.; Fort Wayne Iron & Steel Co., Fort Wayne, Ind.; the Helmbacher mills, St. Louis, and the Republic Iron & Steel Co., East St. Louis. The suspension of operations may be protracted longer than usual because of the failure of the Western Bar Iron Association and the Amalgamated Association to reach an agreement on the wage scale. Complications have arisen, and the manufacturers are now awaiting a call to meet with the conciliation committee of the union. New tonnage and specifications for iron bars are light, but the undertone of the market is strong. Shipments on railroad contracts, which have been light for the past month, will be recommenced with the starting up of mills, specifications from this source, with instructions to start shipping after inventory has been completed, having been heavy in the past few days. New tonnage for steel bars is also brisk; so are specifications. It is noticeable that, in almost every instance, the minimum of contracts for the season of 1907-08 is from 15 per cent to 25 per cent greater than the minimum of orders placed last year. Specifications are also considerably in excess of the volume last year for this period. A good demand for hard steel is felt, but prices are ragged. We quote carload lots, Chicago delivery, as follows:

Bar iron, 1.78c to 1.83c; soft steel bars and bands, 1.78c half extras; soft steel angles, less than 3 x 3, 1.88c; hoops, 2.18c base, full extras; planished or smooth finished tire steel, 1.98c; iron finish, up to 1½ x ½ inch, 1.93c base; iron finish, 1½ x 1½ inch and larger, 1.78c base; channels for solid rubber tire ¾ to 1 inch, 2.28c, and 1⅛ inch and larger, 2.18c; smooth finished machinery steel, 2.18c; flat sleigh shoe, 1.83c; concave and convex sleigh shoe, 2.08c; cutter shoe, 2.36½c; toe calk steel, 2.33c; railway spring, 1.98c; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are irregular, 50 and 10 per cent off the list being offered on carload business and 45 per cent for less than carload lots. On iron and steel bars from local stocks, we quote as follows: Bar iron, 2.25c full extras; soft steel rounds, and square, 3-inch and larger, $2 per 100 lbs. base; flats, 2 inches to 4 inches by ⅛ inch and larger, $2 per 100 pounds base; 4½ inches by 5 inches and 6 inches by 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $2 half extras; soft steel hoops, $2.50 full extras. Other sizes not mentioned above, $2 per 100 pounds base plus half extras.

Plates.—A contract for 6,000 tons has been placed with the Steel Corporation by a local jobber. Further tonnages from this source are under consideration. There is no change in the general situation. The leading interest is sold up for the year and specifications are to full contract quotas. Reasonably prompt shipment can be secured from other makers, however, without the payment of premiums. Prices are without change as follows:

Plates, ¼ inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.70c to 2c Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago, 18c per 100 pounds for carload lots, and 20c per 100 pounds for less than carload lots. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼ inch and heavier up to 72 inches wide, 2.20c; 3-16 inch up to and including 60 inches wide, 2.30c; 3-16 inch, 72 inches wide, 2.55c; No. 8 up to 60 inches wide, 2.50c. Flange steel, 25c extra; heads, 25c extra.

Sheets.—Specifications for sheets continue active. New tonnage is also good, though not in proportion to the consumption of material under contract. Independent mills are offering good deliveries without the payment of premiums. We quote as follows:

Black sheets, Nos. 8, 9, and 10, 1.90c Pittsburg; No. 28, 2.60c Pittsburg. Galvanized sheets, No. 28, 3.75c Pittsburg. Freight to Chicago, 18c per 100 pounds for carload lots, and 20c for less than carload lots. Jobbers' prices on carload lots and less from store are as follows:

No. 10, 2.50c to 2.55c; No. 12, 2.55c to 2.60c; No. 14, 2.60c to 2.65c; No. 16, 2.70c to 2.80c; Nos. 18-20, 2.80c to 2.90c; Nos. 22-24, 2.85c to 2.95c; No. 26, 2.90c to 3c; No. 27, 2.95c to 3.05c; No. 28, 3.05c to 3.15c; No. 30, 3.35c to 3.45c. Galvanized sheets, No. 10 to 20, 3.50c to 3.55c; Nos. 22 and 24, 3.65c to 3.75c; No. 26, 3.85c to 3.90c; No. 27, 4.05c to 4.15c; No. 28, 4.25c to 4.35c; No. 30, 5.40c to 5.45c.

Structural Steel.—Large transactions are pending with local jobbers, contracts aggregating 20,000 tons being under consideration with these interests. More than the ordinary volume of railroad business has come up for figures this week; and of highway bridges, between 8,000 and 9,000 tons are pending. In building work, the tonnage on which figures are asked aggregates 15,000. This includes 11,000 tons for the Oliver building, Pittsburg; 1,100 tons, Ainsworth building, Portland, Ore.; Arlington building, Minneapolis, 1,000 tons, and the Smith building, Seattle, 1,200 tons. A large number of small jobs are also being figured: McClintic, Marshall & Co., Pittsburg, secured the order for 1,500 tons of bridge material from the C. M. & St. P. Ry. Contracts for the new LaSalle hotel, Chicago, are expected to be let Wednesday, of this week. The price of fabricated material is very ragged, competition being keen and much cutting being done. We quote mill material as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For ex-

tras see Pittsburg report. Freight rate from Pittsburg to Chicago, 18c per 100 pounds for carload lots, and 20c per 100 pounds for less than carload lots. Quotations from store are as follows:

All angles, three inches and larger, including six inches, $2.10 per 100 pounds; angles, over six inches, $2.15 per 100 pounds base; beams, 3 to 15 inches inclusive, $2.10 per 100 pounds base; channels, three inches and larger, $2.10 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—The Santa Fe contract for 30,000 tons of open-hearth rails was let this week to the Bethlehem Steel Co. Another western road contracted with the Lackawanna Steel Co. for 5,000 tons of open-hearth rails for this year's shipment. A contract for 8,000 tons of rails was placed with the Illinois Steel Co. by a frog and crossing manufacturer, and a local traction company ordered 2,500 tons of rails from the Carnegie Steel Co. The Pennsylvania Steel Co. closed with the Milwaukee Electric Railway for 1,000 tons of "T" rails. There is a good demand for spikes and bolts for quick shipment. The former have softened in price and are now quoted at 2.40 to 2.50c f. o. b. Joliet. Quotations are as follows:

Bessemer rails, $28 to $30; less than 500-ton lots, $32; open-hearth rails, $29; light rails, Bessemer, 30 to 45-pound sections, $35; 25-pound, $36; 20-pound, $37; 16-pound, $38; 12-pound, $39, and lighter sections down to 8-pound, $45.50, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. On orders accompanying rail contracts for future delivery, we quote f. o. b. Joliet: Angle bars, 1.65c; spikes, 2.25c; bolts with square nuts, 2.65c; with hexagon nuts, 2.80c. For carload lots or less, for prompt shipment, the following prices are asked: Angle bars, 2.25c to 2.75c; spikes, 2.40c to 2.50c; bolts with square nuts, 2.85c; with hexagon nuts, 3c.

Cast Iron Pipe.—A quiet week has passed in pipe. No new municipal jobs of moment have come up, nor are any pending, aside from the Columbus, O., letting, 2,500 tons, which will be disposed of July 10. Prices are firm but without change. We quote four-inch water pipe, $38.60; 6 to 12-inch inclusive, $37.60; gas pipe, $1 a ton higher.

Merchant Pipe and Boiler Tubes.—The general situation is without change. Specifications are free and heavy, and exceed the tonnage shipped from day to day on old contracts. Absolutely no improvement has been made on the delivery question. Contracts for locomotive tubes are being closed in satisfactory volume. We quote mill discounts, carload lots, Chicago delivery, as follows: On steel pipe, jobbers are allowed a concession of one point and 5 per cent additional from the schedule in force:

MERCHANT PIPE.

	—Steel— Black.	Galv.
¼ to 6 inches, inclusive.....	71.2	61.2
BOILER TUBES.		
	Steel.	Iron.
2¼ to 5 inches, inclusive.....	62.2	49.2

Mill quotations on iron pipe are from four to five points higher than above. A concession of one point from the following quotations is allowed by Chicago jobbers on carload orders for shipment from local warehouse stocks. We quote for less than carload lots as follows:

MERCHANT PIPE.

	Black.	Galv.
⅛ to ¼ inch.....	60	44
⅜ inch	62	48
½ inch	64	52
¾ to 6 inches.....	68	58
7 to 12 inches.....	64	49

Minimum prices for wrought iron pipe, carload lots or greater, from Chicago stocks, are as follows: ⅛ inch to ¼ inch, 55; ⅜ inch, 57; ½ inch, 59; ¾ inch to six inches, 64; 7 inch to 12 inches, 59. Boiler tubes from store are unchanged at 60 off for steel; 47½ for iron, and 42½ for seamless, base sizes, 2¼ inches to 5 inches.

Wire Products.—The wants of the agricultural trade seem unending, judged by the steady volume of orders and specifications. A slight seasonable diminution is noted, but even considering this the volume of business is considerably greater than for this period last year. Mills are getting into better shape on deliveries, and at the present rate of progress will have bridged the gap before the end of summer. Jobbers' quotations are without change as follows:

Wire nails, $2.18; painted barb wire, $2.33; galvanized barb wire, $2.63; smooth annealed wire, $2.03; smooth galvanized wire, $2.33; polished staples, $2.28; galvanized staples, $2.58. Carload lots to retailers, five cents higher; less than carload lots, 15 cents higher.

Coke.—A better tone is apparent in the local market. Demand is no heavier, but there is a firmer tendency to uphold prices. Furnace coke, for the last half, is offered at $2.50 to $2.60 Connellsville ovens; and foundry coke from $3.15 to $3.30 ovens.

Old Material.—The holiday last week has interfered with business. But at best, the market is dull. Prices are weak and are susceptible to the least pressure. Little trading is in evidence. The principal feature this week is the large offerings by railroads. The Baltimore & Ohio has a new list out for 8,200 tons; Santa Fe, 2,500 tons; C. & N. W., 1,500 tons; Wisconsin Central, 500 tons; C. R. I. & P., 2,600 tons, and the C. M. & St. P. 1,300 tons. We have revised our prices, and quote gross tons, as follows:

Old Car Wheels	$24.00 to 24.50
Old Iron Rails	23.50 to 24.00
Re-rolling Rails (3 ft. and over)	18.00 to 18.50
Old Steel Rails (3 ft. and under)	17.75 to 18.25
Light Section Relayers, 45 lbs. and under, subject to inspection	**30.00 to 32.00**
Relaying Rails, subject to inspection	**28.00 to 30.00**
Frogs, Switches, and Guards	16.50 to 17.00
Heavy Melting Steel	15.75 to 16.25

We quote net tons as follows:

No. 1 R. R. Wrought	$15.25 to 15.75
No. 2 R. R. Wrought	14.25 to 14.75
Knuckles, Couplers and Springs	15.50 to 16.00
Shafting	17.50 to 18.00
Dealers' Forge No. 1	13.00 to 13.50
Pipes and Flues	12.00 to 12.50
No. 1 Cast, 150 lbs. and less	18.50 to 19.00
No. 1 Mill	**10.25 to 10.75**
Mixed Busheling (Nos. 1 and 2)	11.50 to 12.00
Country sheet	9.00 to 9.25
No. 1 Boiler Cut	11.50 to 12.00
Boiler Punchings	14.50 to 15.00
Cast Borings	10.00 to 10.50
Mixed Borings, etc	10.00 to 10.50
Machine Shop Turnings	12.00 to 12.25
Railroad Malleable	16.00 to 16.50
Agricultural Malleable	15.50 to 15.75
Stove Plate and Light Cast Scrap	15.00 to 15.50
Old Iron Splice Bars	17.50 to 18.00

CLEVELAND.

New Ore Shipping Record.—Pig Iron Dull.—Finished Lines Quiet.

Office of THE IRON TRADE REVIEW, Browning Building, July 10.

Iron Ore.—Complete statistics of ore shipments for June show a movement of 6,433,369 tons, an increase of 944,113 tons, or 17.2 per cent over June, 1906, making a new record for any month in the history of the trade, with a tonnage larger than that of the whole season of 1893, when the movement amounted to only 6,065,716 tons. The shipments to date amount to 12,685,630 tons, an increase of 1,444,034 tons, or 12.85 per cent over the season to July 1, 1906. The three ports at the head of the lakes, Superior, Duluth and Two Harbors, in the season up to July 1, 1906, shipped 66.82 per cent of the entire tonnage, while this season they have shipped 71.28 per cent of the entire amount, showing the increasing output of the new ranges. The movement for July promises to be fully as large as that for June. Railroads are now giving all the cars that the ore interests require, and all conditions on the lakes are favorable for a new record. Shipments by ports for June and for the season to July 1 were as follows:

	June 1907	Per cent of Total	June 1906	Per cent of Total
Escanaba	809,876	12.59	814,304	14.84
Marquette	392,186	6.10	398,490	7 26
Ashland	554,108	8.62	556,701	10.14
Superior	1,217,729	18. 1	885,588	16,13
Duluth	2,156,216	33.52	1 656 831	30 19
Two Harbors	1,3 3,194	20,26	1 176,982	21 24
Totals	6,433,3.9	100.00	5,4-9,256	100.00

	To July 1 1907	Per cent of Total	To July 1 1906	Per cent of Total
Escanaba	1,824,215	14.38	1,738,408	15 46
Marquette	769,059	6 07	802,887	7 15
Ashland	1,049,357	8.27	1,188,763	10.57
Superior	2,318,911	18 28	1,753 775	15.60
Duluth	4,094,046	32 27	3,181,.35	28.30
Two Harbors	2 630,036	20.73	2.5 6.576	22.92
Totals	12 685,630	100.00	11,2 1.5..	100 00

Pig Iron.—Some furnace men complain that the ore this year is falling considerably behind the guarantee of iron content and that the production of the furnaces is about 10 per cent below estimates of capacity. This poor showing of ore is attributed to a large extent to the fact that a new system of sampling has been put in vogue which insures more accurate analyses. It is predicted that on account of this decreased production the output of furnaces will not be so large as generally anticipated. Pig iron is selling for prompt delivery at $23 to $24 valley furnace. Neither the demand nor the supply of spot iron is large. Buying for future delivery is in very limited amounts and prices are somewhat easier, but there is no indication of real weakness. We quote, f. o. b. Cleveland, as follows, the higher quotation being for third quarter delivery and the lower for fourth quarter:

Bessemer	$24.00 to 24.40
No. 1 Foundry	23.75 to 24.00
No. 2 Foundry	23.25 to 23.50
No. 3 Foundry	22.75 to 23.00
No. 2 Southern	23.85 to 24.85
Gray Forge	22.00 to 22.25

Coke.—The market is still very dull and there is little contracting. For last half delivery, the usual asking price is $2.25, but lower prices have been named. Foundry coke is selling at $3 to $3.25.

Finished Material.—New business is not large. Specifications are very heavy, this being true especially of material for new vessels and for steel bars. A considerable number of users of the latter found, as the contract year ending July 1 approached, that they had a considerable tonnage not yet specified, and specifications came in very large quantities. These consumers are depending on old contracts and are not adding to their orders, but there is a fair run of new orders from consumers not so fortunately situated. There is a marked improvement in deliveries, especially of sheets. Bar iron is dull with some inclination toward weakness. The Cleveland iron mills resume operations about July 20. Shafting is irregular with increasing tendency to make concessions to buyers.

Old Material.—Quiet conditions continue, and changes in quotations are all toward lower levels. A further slump is expected during the remainder of the month, but it is believed there may be some recovery in August. The regular summer shut down is now being observed by some mills, but others are still operating. All, however, are disinclined to buy six months ahead. Railroad lists are numerous. The Pennsylvania lines west have sold 4,000 tons. The Wheeling & Lake Erie, the Big Four and Erie lines have also disposed of their offerings and the prices received are generally lower than for May. Among the new lists the Pennsylvania lines east will close the coming week with a very large lot of over 40,000 tons, and the B. & O. with 8,000 tons, Norfolk & Western with 1,200 tons, and the Southern railway with 1,800 tons, will also make awards in a few days. We have revised our prices, which are largely nominal, and quote, f. o. b. Cleveland, gross tons, as follows:

Old iron rails	$23.00 to 24.00
Old steel rails (re-rolling)	17.75 to 18.75
Old steel rails (under 6 feet)	17.50 to 18.50
Old car wheels	23.00 to 24.00
Steel boiler plate	14.50 to 15.50
Steel axles	22.00 to 23.00
Malleable iron (railroad)	18.75 to 19.25
Malleable iron (agricultural)	17.25 to 17.75
Heavy steel	16.50 to 17.00
Country mixed steel	15.25 to 15.75
Low Phosphorus	21.50 to 22.50

We quote net tons as follows:

No. 1 R. R. wrought	$16.50 to 17.00
No. 1 busheling	14.50 to 15.00
No. ' machine cast	18.75 to 19.25
Iron axles	25.00 to 26.00
Axle turnings	13.50 to 14.00
Machine shop turnings	12.25 to 12.75
Grate bars	15.00 to 15.50
Pipes and flues	14.00 to 15.00
Tank iron	12.50 to 13.50
Hoop and band iron	8.50 to 9.00
Sheet iron	7.50 to 8.50
Wrought drillings	12.25 to 12.75
Stove plate	14.50 to 15.00
Cast borings	10.75 to 11.25

CINCINNATI.

Slight Improvement in Demand, But Sales Are Not Numerous.—Scrap Easy.

July 9.

Pig Iron.—There has been a slight improvement in business transacted through the offices here the past week. Spot iron has had more call and while there has been enough offered to take care of the demand, the dullness in the market has not been so pronounced. Sales were mainly at $20.50 Birmingham for southern brands, although some occasional orders were taken at $21. An inquiry from an Indiana melter for No. 2 and No. 4 early delivery iron is under consideration. For No. 4 foundry the open price is $19 Birmingham while $18.50 can be done. Prompt shipment gray forge is nominally quotable at $17.25 to $17.50, Birmingham. An occasional sale of northern spot is made at $24. to $25 at furance. Quotations for prompt delivery, delivered Cincinnati, are as follows:

Southern Foundry No. 1	$24.25 to 24.75
Southern Foundry No. 2	23.75 to 24.25
Southern Foundry No. 3	23.25 to 23.75
Southern Foundry No. 4	21.75 to 22.25
Southern No. 1 Soft	24.25 to 24.75
Southern No. 2 Soft	23.75 to 24.25
Southern gray forge	20.50 to 21.00
Northern No. 1 foundry	25.65 to 26.65
Northern No. 2 foundry	25.15 to 26.15
Northern No. 3 foundry	24.65 to 25.65

Most of the business under consideration and the few sales that have been made cover delivery in the last half of this year. A sale of Bessemer iron at about $23.25 furnace is reported. There is a fair scattering inquiry for silvery iron and prices are well maintained on this specification. There is some talk of the leading interst in cast iron pipe having bought some iron, but this could not be confirmed here. It is also rumored that some No. 3 southern iron sold at $17.50 Birmingham to an Ohio melter for delivery in the first half of next year. The tone of the market is not quite so weak as reported in our last letter, but sales are mainly at inside prices. This indicates, however, that for the little business going there was no disposition to go below present quotations. While the trade believes that there are some consumers who have not bought for the second half of the year, there is confidence that enough iron will be available to provide for such tonnage as may be called for. We quote for fourth quarter delivery, delivered Cincinnati as follows:

Southern Foundry No. 1	$22.75 to 23.25
Southern Foundry No. 2	22.25 to 22.75
Southern Foundry No. 3	21.75 to 22.25
Southern Foundry No. 4	21.25 to 21.75
Southern Foundry No. 1 Soft	22.75 to 23.25
Southern Foundry No. 2 Soft	22.25 to 22.75
Gray Forge	20.25 to 20.75
Northern Foundry No. 1	23.65 to 24.15
Northern Foundry No. 2	23.15 to 23.65
Northern Foundry No. 3	22.65 to 23.15

Finished Material.—The retail demand continues good and dealers are placing mill orders to replenish stock, although deliveries on some specifications are not expected for three to four months. Prices are well maintained. A steady call for twisted bars for concrete work is noted. Small orders are filled at the following prices here:

Angles, 3 x 3 and over, 2.15c to 2.25c; beams and channels, 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2.10c; 3-16 inch 2.20c; No. 8, 2.20c; sheets (blue annealed) No. 10, 2:30c; No. 12, 2.35c;

No. 14, 2.40c; No. 16, 2.50c; box annealed sheets, Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c; and No. 28, 2.95c. Iron and steel bars, 2.00c base; boiler tubes, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3.15c base; cold rolled shafting, 45 per cent off list; steel tire, 2.10c base.

Coke.—The market is unchanged as to prices and there is less interest on the part of buyers as contracts for the second half of the year have been placed to a large extent. Some ovens have taken on enough business to strengthen their position and there is not so much general anxiety for business. Prices continue irregular and quotations have a wide range. Quotations in the leading coke producing districts are as follows:

Wise County, Va., Furnace Coke, prompt shipment	$2.40 to 2.50 per ton
Wise County, Va., Foundry Coke	3.00 to 3.10 per ton
Pocahontas Furnace Coke, prompt shipment	2.50 to 2.75 per ton
Pocahontas Foundry Coke	3.00 to 3.25 per ton
Connellsville Furnace Coke, prompt shipment	2.40 to 2.65 per ton
Connellsville Foundry Coke	2.90 to 3.50 per ton
New River Foundry Coke, prompt shipment	3.00 to 3.50 per ton
New River Furnace Coke, contract	2.65 to 2.75 per ton

Old Material.—The market rules quiet with an easy tone prevailing. There is not much demand and prices are a shade lower on some description. We quote:

Old No. 1 R. R. wrought net tons	$17.00 to 17.50
Cast machine and f'dy, net tons	19.25 to 19.75
Old iron rails, gross tons	24.00 to 25.00
Old steel rails, gross tons	18.25 to 19.25
Old short lengths, gross tons	18.00 to 19.00
Old iron axles, net tons	26.50 to 27.00
Heavy melting scrap, gross tons	21.00 to 22.00
Stove plate, net tons	15.00 to 15.50
Wrought turnings, net tons	13.00 to 13.50
Cast borings, net tons	11.00 to 11.50
Car wheels, gross tons	23.50 to 24.50

PHILADELPHIA.

Pig Iron Very Dull and Prices Easier.—Finished Material Active.

July 9.

Pig Iron.—There has been little change from last week, and that little has been in the direction of easier prices and more pronounced dullness. With the disappearance of premiums for spot iron, prices for July and for the whole third quarter are now practically identical, and the difference between prompt and deferred shipments has been much reduced. As most of the furnaces have their capacity pretty well sold up for the third quarter, there is no disposition to press iron on the market at the sacrifice of prices, but these sag naturally in the lack of demand. There is nothing like demoralization, and the movement is generally looked upon as a healthy one and of ultimate benefit to the trade, as it is recognized that in many lines of finished products the margin of profit has been small. Indeed, the present improvement in finished material activity is looked upon as largely due to the decline in pig iron prices. No large sales are reported, and none are looked for before August, but sufficient buying is expected to keep prices from taking any pronounced drop. These may be quoted for the third quarter about as follows:

No. 1X Foundry	$24.25 to 24.75
No. 2X Foundry	23.75 to 24.25
No. 2 Plain	22.75 to 23.25
Standard Gray Forge	22.00 to 22.50
Basic	23.00 to 23.50
Low Phosphorus	27.75 to 28.00

Finished Material. — Concurrently with the decline in pig iron and scrap the market for finished products seems to have taken on new life, and the volume of new business is reported as very large at the eastern mills. Especially notable is the demand for plates and steel bars, the orders for which insure activity for several months to come. Iron bars are rather dull. The increase in freight rates has led to a revision in prices, which are now quoted as follows: Beams, channels and angles, according to specifications, 1.85c to 1.90c; refined iron bars, 1.80c to 1.90c; steel bars, 1.75c to 1.85c; plates, 1.85c to 1.90c.

Old Material.—The market is dull and weak, due to the shutting down of mills and to their natural hesitation to buy when prices are falling. The lack of orders is bringing quotations down from the high figures that have prevailed so long, but they are still well up as compared with last year. For the present they may be quoted as follows:

Old steel rails	$19.00 to 19.50
No. 1 steel scrap	18.25 to 18.75
Old steel axles	21.50 to 22.00
Old iron axles	29.00 to 30.00
Old iron rails	26.50 to 27.00
Old car wheels	23.50 to 24.00
Choice scrap R. R. No. 1 wrought	20.00 to 20.50
No. 1 yard scrap	18.00 to 18.50
Machinery scrap	20.50 to 21.00
Low phosphorus scrap	23.50 to 24.00
Wrought iron pipe	16.00 to 16.50
No. 1 forge fire scrap	16.50 to 17.00
No. 2 forge fire scrap, ordinary	11.50 to 12.00
Wrought turnings	15.50 to 16.00
Axle turnings, heavy	17.00 to 17.50
Cast borings	15.00 to 15.50
Stove plates	17.00 to 17.50

NEW YORK.

Pig Iron Extremely Quiet.—No Important Sales in Finished Lines.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., July 9.

Pig Iron.—Buying by pipe and pump manufacturing interests has served to instill into the current market some semblance of activity, but with these exceptions business has been at a practical standstill, what little is going being made up chiefly of carlots. A steam pump concern has closed for two small lots of early delivery iron at favorable prices and is in the market for 200 tons of high silicon iron. The pipe purchases were for consumption in the Pittsburg and Cincinnati districts and, it is understood, were made through agencies in those cities. Furnace interests are inclined to regard the absence of new inquiry as merely the usual mid-summer lull and, in most instances, are holding firmly at past quotations and are making no active efforts to dispose of their unsold iron, which is chiefly a moderate portion of the fourth quarter output. Requests for delayed shipments are more than offset by calls for anticipations and are not an important factor in the market. The British situation is slightly firmer, with No. 3 Middlesbrough at 57s 3d, and small lots selling at tidewater on the basis of $21.00. Stocks in Connal's yards at the beginning of the month were down to 260,000 tons and the outward movement continues on the strength of commitments made some time ago. No further engagements are now being made. Quotations manifest little change and are as follows at tidewater, the lower figure being for forward delivery.

Northern Foundry No. 1	$24.00 to 25.00
No. 2X Foundry	23.50 to 24.50
No. 2 Plain	23.00 to 24.00
No. 2 Southern Foundry	23.50 to 25.50
Basic	23.00 to 24.00

Ferro-Manganese.—There is little demand in the local market and business is accordingly very light. Considerable confusion has resulted from newspaper reports of a recent sale of 1,000 tons in Pittsburg. According to press accounts, this was at $60 delivered, whereas the fact was that the price was $60, tidewater, or $62, Pittsburg. In spite of the light demand it is probable that much difficulty would be encountered in attempting to duplicate this low figure, as ferro manufacturers are operating on an extremely narrow margin, and there are occasional reports of a suspension of operations until a recovery in prices is made.

Finished Material.—Both in placing of actual contracts and in new inquiry the past week has proven probably the most quiet of the year. No important undertakings are coming to the surface and the only large project, the power house of the New York Edison Co., involving close to 10,000 tons of structural materials, is still pending, though an award is expected at any time. Specifications, however, are all that could be desired and mills are generally well supplied with orders which will keep them running to capacity for months to come. In steel rails there is apparently an inclination to delay buying until the commission of rail manufacturers and railway experts announces

its findings, and this will not be before at least two months. There is an inquiry, however, for 12,000 tons of 60-pound rails for shipment to Japan. In cast iron pipe, the only letting of importance during the week was that of the city of New York, 5,600 tons, the order being secured by M. J. Drummond & Co., it is stated, at the low price of $32.20. In bar iron, the dullness incident to other lines prevails and no large tonnages are included in current business. Though the 1.70c Pittsburg base is still quoted, it is intimated that this can be shaded. We quote: Angles, 3 to 6 inches x ¼ inch and heavier, 1.86c; beams, 3 to 15 inches, 1.86c; tees, 3 x ¼ and heavier, 1.91c; plates, carloads, tank, 1.96c; marine boiler, 2.26c; bar iron, 1.86c; soft steel bars, 1.76c; sheets, No. 28, black, 2.60c.

Old Material.—The situation is weaker and prices are lower in a number of lines. Rolling mill stock is in poor demand. There is a very fair demand for steel scrap, but the recent placing of embargoes at certain large consuming points, notably Coatesville and Ivy Rock, Pa., will serve to delay shipments for a time. We quote New York prices, gross tons, as follows:

Old iron rails	$24.50 to 25.50
Old steel rails, rerolling	18.00 to 18.50
Relaying rails	27.00 to 28.00
Old car wheels	23.50 to 24.00
Old iron car axles	28.50 to 29.50
Old steel car axles	21.00 to 21.50
Heavy melting steel	15.75 to 16.00
No. 1 railroad wrought	17.50 to 18.00
Iron track scrap	17.00 to 17.50
Wrought pipe	14.00 to 14.50
Cast borings	13.50 to 14.00
Wrought turnings	14.00 to 14.50
Heavy cast scrap	18.75 to 19.25
Railroad malleable	17.00 to 18.00
Agricultural malleable	15.00 to 16.00
Stove plate	15.50 to 16.00
Grate bars	14.50 to 15.00

BUFFALO.

Pig Iron Market Very Dull.—No Change in Quotations.

July 9.

Pig Iron.—Nothing has occcurred the past week to disturb the quiet of the market and, if any change has taken place, it has tended toward a greater dullness in pig iron circles. All the furnaces in this district are running at capacity and supplying customers with contract iron. No prompt delivery iron has been offered during the week. Valley furnace men are offering no spot this week in this territory so far as could be learned, and no new quotations on future deliveries are at hand. It was explained that the valley furnaces are content now with filling old contracts as fast as possible and are not anxious about next year's business.

The tone of those familiar with the market speaks for firm prices and they see no weakness in market conditions. Prices are unchanged. We quote for last quarter delivery as follows:

No. 1X Foundry	$23.75 to 24.00
No. 2X Foundry	23.00 to 23.50
No. 2 Plain	22.50 to 23.00
No. 3 Foundry	22.75 to 23.00
Malleable Bessemer	23.00 to 23.50
Gray Forge	22.00 to 22.50
Charcoal	27.00 to 27.50

ST. LOUIS

Pig Iron Dull, but Melters Ask for Anticipation of Shipments.

July 8.

Pig Iron.—The market is dull, but steady. There is very little demand for spot pig iron on account of shipments on contracts moving freely. A great many melters have asked furnace men to make shipments on contracts for the last half of the year as early in July as possible, which St. Louis dealers assert indicates that they are depending on contract iron to supply their requirements.

Our quotations for spot shipment, f. o. b. Birmingham, to which the freight of $3.75 per ton is to be added, follow:

No. 1 Southern	$22.00 to 22.50
No. 2 Southern	21.50 to 22.00
No. 3 Southern	21.00 to 21.50
No. 4 Southern	20.50 to 21.00

Coke.—Demand for foundry coke strengthened last week, but because of large offerings by the ovens, the price has remained about the same. Standard Connellsville 72-hour foundry coke is quoted at $2.70 to $3.25; Connellsville 48-hour furnace from $1.90 to $2.40; smelter coke, $2.75 to $2.85, to which the freight of $2.80 to East St. Louis and $2.90 to St. Louis is to be added.

Finished Material.—The inquiry on light rails is normal. The demand for bars is very good and customers are pressing for deliveries. Demand for structural material is increasing and the outlook is optimistic. Standard rails are moving slowly for 1908 purchases.

Scrap Iron.—Prices show some decline because some of the mills are shutting down to make repairs and on account of their failure to secure help during the hot season.

Our quotations follow:

	GROSS TONS
Second-hand Relaying Rails, according to time of delivery	$29.00 to 32.00
Steel rails (less than 3 feet)	16.00
Car wheels	24.00
Iron rails	24.50
Re-rolling steel rails	17.00
Heavy melting steel	16.50
Country steel mixed	15.00
	NET TONS
No. 1 R. R. wrought	$16.50
No. 2 R. R. Wrought	15.00
Iron splice bars and fish plates	19.00
Iron car axles	24.00
Steel car axles	19.50
Locomotive tires, smooth inside	15.00
Iron shaftings (3 to 6 inches)	18.00
Country wrought	15.00
Pipes and flues	13.00
Heavy machinery	17.50
R. R. cast (less than 300 pounds)	17.00
No. 1 Busheling	14.00
No. 2 Busheling	13.50
Boiler sheet and rings	13.00
R. R. cast borings (free of inferior quality)	10.00
R. R. wrought turnings	13.50
Machine shop turnings (free from brass)	11.00
Railroad malleable	16.50
Agricultural malleable	15.00
Cast stove plate	14.00

BIRMINGHAM, ALA.,

Pig Iron Market Quiet, But No Fears Are Entertained.

July 8.

Alabama pig iron manufacturers report that, while the market is still quiet, no faith has been lost and that the prospects for the future are very bright. A few sales are being made with no efforts being exerted to secure business. Prices are firm with nothing being done as far as spot trading goes. The manufacturers in this district appear to be behind a little yet in deliveries and for that reason are not inclined to attempt handling any of the spot iron transactions. A few sales are again recorded for delivery during the first half of the coming year, though the aggregate business transacted so far is not very great. It is confidently expected that by the end of the present quarter the buying for the first half of the coming year will be well in hand and that something will be said as to probable make for the first three months being covered. Fourth quarter sales are still steady, $21 being obtained for the product; No. 2 foundry third quarter iron, practically spot, is quoted at $22.50 per ton, with but little selling because of the furnace companies not being able to handle the business. For the first half of the coming year iron sells at $18.50 per ton, No. 2 foundry.

BRITISH IRON MARKET

Pig Iron Shows Weakness Owing to Depressing American News.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., June 26.

The pig iron market has shown decided weakness during the whole of the past week, mainly, as it seems, on account of somewhat depressing American advices. A little recovery has been reported during the last two days owing to a feeling that the fall has been overdone. The closing price yesterday was 56s 1½d ($13.73) for Middlesbrough. There was a recovery of about 6d on the day, but the price was still well below that of a week ago. The prices at the end of last week were the lowest since April. A curious fact

is that shipments continue unabated, the total this year up to the end of last week being 195,005 tons, an increase of 58,646 tons on the same period in 1906. Yesterday's business totaled 18,000 tons at Glasgow.

Pig iron shipments for last month constituted a record and since the beginning of June warrant stocks have declined 45,000 tons, the present reserve being 277,120 tons. At this rate of diminution, it is easy to see how long the remaining stocks will continue. In spite of this dealers display very little nerve, and take fright on the smallest provocation. Hematite is still reducing and in the Furness district stocks have gone down from 70,000 tons a year ago to 27,348 tons. There was a decidedly heavier call for foundry iron on the Birmingham Exchange on Thursday last. In the Midland district prices of pig iron have once more entirely resisted northern influences, and continue very steady. It is announced on good authority that a local firm is about to blow in another furnace. Three furnaces, it is said, are to be started in Northamptonshire, one of which is owned by the Kettering Iron Co. A number of inquiries have been received in the Northamptonshire district for continental delivery, but smelters have entirely declined to entertain them, having several months' work ahead for home requirements.

METAL MARKET.

NEW YORK.

July 9.

Copper.—Although it is confidently expected that a break must soon be made, inasmuch as heavy August requirements are as yet to be covered, the week has seen little progress toward the breaking of the long continued deadlock and business has been extremely light in the local markets. There has been greater activity abroad, presumably because many short commitments must be covered in the near future. Domestic quotations manifest little change, being on the following level: Lake, 23c to 23½c; electrolytic, 22c to 22½c; casting, 21c to 21½c. London prices, however, are somewhat higher, yesterday's close being £100 10s for spot and £94 10s for futures.

Pig Tin.—The foreign market has been the scene of chief activity during the week, with the result that the London price has advanced sharply, closing yesterday at £199 for spot and £182 for futures, the premium having increased heavily during the week on the strength of reports of decreased production. Domestic business, however, has been light, and prices are somewhat lower, the range now being from 42½c for spot to 40c for September shipment.

Pig Lead.—A sharp drop has resulted from the action of the leading producer in reducing its price $10 per ton. The demand, however, is still light at the new quotations, 5.25c at New York for desilverized and 5.20 for soft Missouri at St. Louis. In the London market soft Spanish closed yesterday at £20 15s.

Spelter.—Eagerness for business has brought about slightly lower prices, the present level being 6.25c to 6.30c for refined at New York and 6.15c to 6.20c at St. Louis. G. M. B. closed yesterday on the London market at £24 5s.

Antimony.—There is little demand and business is practically nil. Cookson's is quotable at 14c to 14½c; Hallet's at 12½c to 13c; and ordinary brands at 10½c to 11c.

CHICAGO.

July 9.

The local metal market during the week was quiet and only one change in prices occurred. Lead dropped off slightly in line with the general tendency of the past three weeks. Buying in all metals was quiet.

Copper lake sold for 26c and casting between 24c and 24½c. Sheet zinc was quoted at 8.60c La Salle in car lots of 100-pound casks. Spelter remained at 7.25c. Pig tin varied between 45¼c and 45½c. Lead desilverized dropped to 5.75c and 5.85c and corroding to 6.40c and 6.60c in 50-ton lots. The price in car lots was 2½c higher. Cookson's antimony sold at 20c and 21c and other grades at 18c.

Little activity was apparent in the second hand metal market. Unimportant changes in prices occurred. Buyers' prices were quoted:

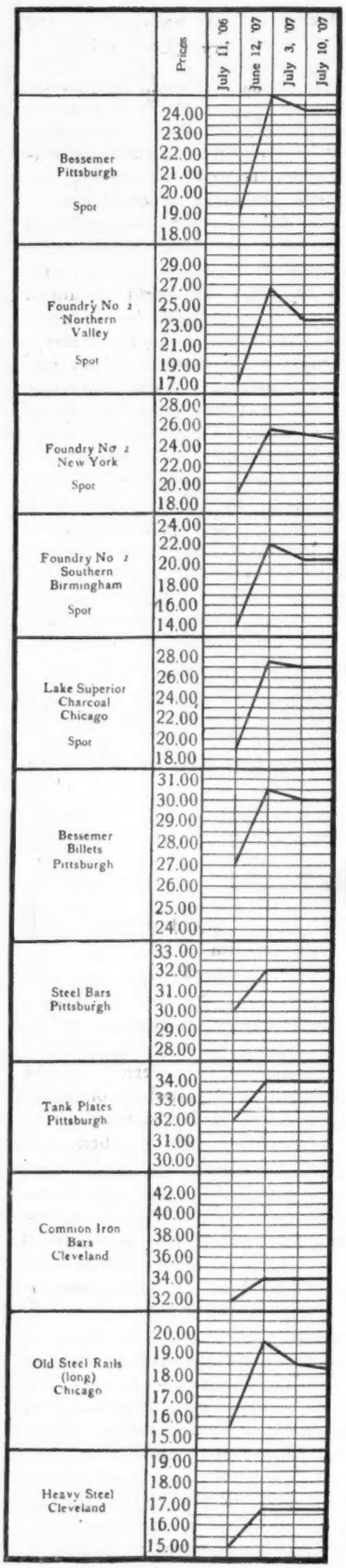
Copper wire, 17.75c to 18c; copper, heavy, 17.50c to 18c; copper, bottoms, 16c to 17c; copper, clips, 17c to 18c; red brass, heavy, 16c; yellow brass, heavy, 12c to 13c; red brass, borings, 14c; yellow brass, borings, 11c to 12c; light brass, 9c to 9.75c; zinc, 4.25c to 4.75c; pipe lead, 4.50c; tea lead, 4c to 4.25c; tin foil, 31c to 33c; pewter, No. 1, 27c to 29c.

ST. LOUIS.

July 8.

Lead and Zinc.—Shipments were small last week, owing to the Fourth of July coming in the middle of the week and interfering with mining and shipping of ore. Many of the mines in the district gave a three-days' holiday, others gave two days, and nearly all were idle one day, thus causing a reduction in the output and shipments of approximately 25 per cent.

PRICE CHART.



BRIGHTER OUTLOOK

In Machine Tool Business in the East—Machinery Club Activity.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St.,
New York, July 9.

Despite the inevitable lull incident to the Fourth, active business in machine tools is reported during the past week, and the outlook is considerably stronger. This is explained by the evident intention of the larger railway interests to go ahead with improvement work already planned or contemplated, it now being apparent that the much-discussed recession movement is at least to go no further. A number of railway representatives happened to meet in the offices of a large machinery and supply house early during the week, and this was found to be the situation with each of the roads represented. Although one occasionally finds a dealer who is not so optimistic over the outlook, the consensus of opinion is that the increased inquiry of the week indicates the beginning of greater activity in the trade. Sales include no large lots, being chiefly confined to individual machines, but the aggregate is so heavy that scarcely any betterment in deliveries is noticeable. In fact, with some concerns deliveries are still further advanced. Punching and shearing machinery is in lighter demand, but otherwise the current inquiry is general. An important pneumatic tool interest reports that it is booked to capacity for four months ahead and is steadily losing ground on deliveries, though making no active efforts to push its products. Here, too, the general run of railway buying is contributing heavily to current business.

A meeting of the governors of the Machinery Club was held Monday of this week, the chief business being the voting in of 170 members, the first to be formally elected into the organization. The extent to which the club is taking hold of the machinery field in New York is evidenced by the fact that one concern, the Lidgerwood Mfg. Co., is represented by 15 members of its official and selling organization.

A meeting will shortly be held by the incorporators of the Mosher Water Tube Boiler Co., 1 Broadway, for organization and the election of officers. The capitalization is $200,000, and the new company will succeed to the business heretofore carried on under that name. In addition, negotiations are practically completed whereby the company will acquire a modern manufacturing plant in the vicinity of New York.

Batcheller, Clarke & Batcheller, 107 Liberty street, announce that after July 15 William A. Gibson will represent them in New England on cranes and hoists and electrical equipment, making his headquarters at the New York office.

With the placing of contracts for the structural steel required for its new power station, bids on which closed a week ago, the New York Edison Co., Elm and Duane streets, is expected to enter the market for a large amount of equipment. The size of the plant can be estimated from the structural steel tonnage involved, about 10,000 tons in all.

The Compania Mineral de Penoles has placed an order through the New York office of the Connersville Blower Co. for a blower with a capacity of 300 cubic feet per revolution for installation at its Mexican plant where its smelting capacity is being greatly enlarged. It is understood that considerable equipment is being purchased through H. J. G. Mackey, 84 Beaver street, New York.

Negotiations have been completed whereby William H. Myers, of York, Pa., and B. Frank Royer, of Philadelphia, will be the managers and the two principal stockholders of the Variety Iron Works, of York. The properties have been formally transferred from the E. G. Smyser Sons' Co. to the Smyser-Royer Co.

The N. & G. Taylor Co., Philadelphia, is making a number of improvements at Cumberland, Md., where are located its open-hearth furnaces, rolling mills and blackplate plant. These include a new gas producer, which is being installed by the Forter-Miller Eng. Co. of Pittsburg. The company states that its blackplate mills are taxed to meet the demand for the special grade of blackplates used as a base for the hand-made roofing tin which it manufactures.

The Victor Talking Machine Co., Camden, N. J., which is shortly to begin work on an extensive addition to its present plant, states that its machinery requirements have been filled, some orders having been placed as long as eight months ago. Albert C. Middleton is secretary.

The Allegheny furnace of the Allegheny Ore & Iron Co., Clifton Forge, Va., was blown out June 27 for relining.

The Cleveland Furnace Co., Cleveland, started work June 13 upon its second stack in that city.

MASTER SHEET METAL WORKERS' CONVENTION.

The National Association of Master Sheet Metal Workers will convene at the convention headquarters, Hollenden hotel, Cleveland, Wednesday morning, Aug. 14. This session will be taken up with reports of the secretary and treasurer, appointment of committees, enrolling the delegates, etc. In the afternoon the convention will be formally welcomed to Cleveland by Mayor Tom L. Johnson. This will be followed by the report of the president. The joint committee on tin plate will present a report of the work done during the past year. The finance committee appointed by the authority of the last convention to recommend a financial plan, will report.

The following papers will be read and discussed during the different sessions:

"The Cost Factor in Business."

"Extent of the Open Shop Movement."—Paul L. Biersach, Milwaukee, Wis.

"Warm Air Furnace Heating and Ventilating: Its Superiority."—Harvey Fuller, Philadelphia.

"Why It Fails."—Arthur McManus, Hartford, Conn.

"Proper Education of the Furnace Owner."—R. S. Thompson, Springfield, O.

"Aluminum: The New Metal in the Sheet Metal Trade."

"Trade Protection: From a Jobber's Standpoint."—J. M. & L. A. Osborn Co., Cleveland.

"Its Need Among the Trade."—B. F. John, Philadelphia, Pa.

"The Modern Apprenticeship Method and Its Results."—David Lupton's Sons Co., Philadelphia. Dowman & Dozier Mfg. Co., Atlanta, Ga.

"Association Finances." — E. W. Richards.

"State Associations."—Otto Goebel.

Thursday afternoon will be given over to an outing. On Friday the convention will complete its work and adjourn. The trustees and various committees will meet in the afternoon and evening of Tuesday, Aug. 13, at the Hollenden.

The chairmen of the different committees are: Ways and means, Robert Kain; finance, Martin W. Sheaman; headquarters and display room, John E. Callaghan; entertainment, G. F. Thesmacher. A committee has also been appointed to look after the comforts and entertainment of lady visitors.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BUFFALO.....932 Ellicott Sq.
CHICAGO.....1362 Monadnock Blk.
CINCINNATI.....124 Government Place.
NEW YORK.....1005 West Street Bldg.
PITTSBURG.....521 Park Bldg.
DULUTH.....411 Providence Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co., will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND, AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP

July 11, 1907.

OUR MODEST PLACE IN IRON AND STEEL EXPORTS.

The recently cabled reports of an immense British combination of iron and steel interests, while incorrect, gave rise to comments in some financial publications about the non-formidable nature of the competition which such a consolidation could give, which are quite typical of the misinformation which exists in some quarters as to the position of the United States in international markets. These comments appear to have been made in the spirit that the United States has placed itself in so impregnable a position, in the world markets, that no arrangement made by foreign producers can dislodge it. As a matter of fact, if such a consolidation were made, it would fail to be formidable, not because the United States cannot be dislodged from its position, but rather because it has no position from which to be dislodged. The United States easily leads all nations in the production of iron and steel, but it also leads all in keeping the material at home. Only the most inconsequential producers keep as large a percentage of their output for the domestic market. The iron and steel exports of the United States constitute only about one-tenth of all iron and steel exports.

The following table gives, in gross tons for the United States and Great Britain, and in metric tons for the other countries named, the exports of iron and steel in the past three calendar years:

	1906.	1905.	1904.
Great Britain....	4,688,846	3,721,515	3,266,248
Germany	3,666,274	3,349,968	2,770,276
Belgium	1,131,120	1,060,998	912,623
France	643,562	749,905	720,141
Totals	10,129,802	8,882,386	7,669,288
United States....	1,325,157	1,010,255	1,167,678
Grand totals...	11,454,959	9,892,641	8,836,966

Other countries, including Russia, Austria-Hungary, Spain, and Sweden, export some iron and steel, so that while the table above shows that five countries in 1906 exported 11,454,959 tons, of which the United States exports constituted 8.6 per cent, the percentage of all iron and steel exports contributed by the United States is less than 8.6 per cent.

Great Britain, with exports in 1906 almost four times those of the United States, can be considered as not a formidable competitor only from the viewpoint that there is nothing to compete about.

It is true that there are differences in classification of exports by the different countries which make exact comparisons impossible. The foreign statistics return some commodities by weight which are not so returned in the United States, but in general they carry the material to a higher degree of finish, which more than makes up for any irregularities.

The production of pig iron in the world in 1906 was about 59,000,000 gross tons, and of this the United States made 25,307,191 tons, or about 43 per cent, truly a most satisfactory showing, but that percentage is quite different from the 8 per cent contribution made to all iron and steel exports.

There is a disposition, born also of a disposition to avoid the investigation of easily accessible facts, to assume that the United States is largely increasing its exports of iron and steel, and is thereby obtaining a more important place in world markets. The exports of the four countries, outside of the United States, named above, increased 32.1 per cent from 1904 to 1906; the exports of the United States, according to the classification, increased in the same time only 13.5 per cent. Even this small increase, however, was not a real one, since in 1906 the United States total includes pipes and fittings, while in the two preceding years the tonnage of pipes and fittings was not returned. The exports of iron and steel in 1906, outside of pipes and fittings, were but 15,000 tons greater than the similar exports in 1904, so that there was really no gain at all, while the other countries made a gain of 32.1 per cent.

In other words, while the United States made no real gain in exports from 1904 to 1906, four other countries made a gain of 2,460,514 tons, or more than double the total exports of the United States. If this competition is not already formidable, it is because it is not competition at all.

It may be argued that the past two years have been years of remarkable prosperity in the United States, and there was no occasion to push exports; that a different story would have been told had the United States needed to export heavily. There are two sides to this question. The prosperity has been world wide; these other countries have been hard pushed to meet the demands of the home and foreign markets; perhaps had they wanted tonnage the United States might not have been able to export as much as it did, let alone making an increase.

The production of the United States has grown so large that even a large part of the international trade would be small for it. The total exports of all the producing countries—and they are made partly to each other—do not equal one-half the present domestic consumption of the United States. This country must continue to act on the ground that its own home market is its greatest asset, and it must stand or fall by it.

Exports may help, at times, by relieving one branch or another from strain, but no general export movement can ever be expected to bear any reasonable proportion to the enormous domestic demand now being experienced.

It is this peculiar alignment of American production to exports which is the cause of the great and growing feeling of unrest in iron and steel circles abroad, an unrest which has lately been referred to in these columns. The foreign producers realize that should conditions in the American market change, the tonnage which would seek export channels would be enormous, according to foreign standards. Whether it would gain them or not would be a secondary matter; either failure or success would be attended with discomfort on both sides of the Atlantic.

SLIDING SCALE CONTRACTS STAND THE TEST.

The scarcity of Bessemer pig iron which has existed for months and bids fair to continue for some months to come has furnished as severe a test as could well be imagined of the equity of the sliding scale contract, based upon Bessemer pig iron, for the determination of settling prices for pig iron, billets, and finished steel products. These contracts have been under pressure of late because pig iron has advanced, in the past year, much more than have finished steel products, yet it is not known that serious differences have arisen from any of these contracts. Occasionally it has happened at various times in the past, and doubtless it will always happen at times, that the settlement price as disclosed by such a contract is higher than the recognized market price, but such instances are much in the minority, and are the exceptions which test the rule.

These contracts have been fairer to consumers, in these times of stress, than they would have been had the producers of Bessemer pig iron been less broad minded. Their motives are, of course, not altruistic, but are merely those of enlightened self interest, for they know that whatever goes up must come down. The curve of prices in Bessemer pig iron is a much more even line than that representing prices of foundry iron.

Some of these contracts involve a settlement for material delivered during a given month, according to the sales of pig iron during the same month. Some others, particularly for billets, take the average of one quarter's prices as the settlement basis for the succeeding quarter. In pig iron the former is the more equitable basis, since maximum tonnages are called for in times of greatest stress and it is only fair that the consumer should pay the higher price when he most needs the tonnage, seeing that it is an accommodation on the part of the seller to allow a leeway in the matter of tonnage.

The advance in the Bessemer average has not been as great as might be supposed from general market conditions in pig iron. The average in the quarter just expired was $23.50 Pittsburg, or about $5.35 higher than in the second quarter of last year, the price in that quarter having been about the same as in the preceding quarter. The third quarter of last year showed an advance of less than 70 cents, the following quarter showing an advance of about $3.40. Since then the advances by quarters have been very light. Present market indications are that there will be an advance in the present quarter of something between 75 cents and a dollar. This quarter should mark the high point, at about the June average, unless a new burst of buying takes the market entirely out of sellers' hands.

One of the furnaces of the Allentown Rolling Mills Co., Allentown, Pa., was blown out June 20. The company expects to blow in some time in July its second stack, which has not been running for some time.

The Shelby Iron Co., Shelby, Ala., expects to blow in stack No. 1 in July, which was closed down May 17 on account of a fire in the sheds. Coke will be the fuel used.

BRAVE 'FRISCO

Struggling Against Earthquake, Fire, Strikes and Corruption.

San Francisco, July 5.—But for her wonderful vitality, San Francisco, the Queen of the Pacific, would have perished long ago, crushed beneath the weight of numerous ills. The earthquake and fire, corruption, maladministration of public affairs, thievery and scandal, industrial strife and strikes almost completed what was left of the city after passing the other plagues and ills. That people, conservative people, still have faith in the future of San Francisco is due to many natural advantages San Francisco enjoys;—location, harbor, inexhaustible resources of California, mineral wealth of Nevada, timber of Oregon and Washington, and numerous other advantages. If the pessimist would only cease knocking, the optimist cease booming, and correspondents would give simple, ungarbled facts concerning San Francisco, intelligent persons outside of California would be better able to draw correct conclusions of the state of affairs. It is useless to conceal the fact that the recent strikes of the iron workers have deprived the local plants of work amounting to several millions. Fortunately there are enough jobs on hand to keep all the shops busy for some time to come, in fact, there is room for a few thousand more mechanics in San Francisco, its suburbs and in the navy yard. The following are a few of the more important jobs, some about being completed, while others are only in their early stages and will require several months to be completed.

It has been officially announced at the Mare Island Navy Yard that the new cruiser California, sent to that station from the Union Iron Works to be completed as a result of the iron workers' strike in San Francisco, will be placed in commission at the yard in about two weeks. The vessel has been practically completed by the Mare Island mechanical force, and orders to commission her have recently been received from Washington. The California is an armored cruiser with a displacement of 13,680 tons and an indicated horsepower of 23,000. She is a sister ship of the South Dakota, and carries a main battery of 18 tons.

Owing to the settlement of the iron workers' strike, the South Dakota will be completed at the Union Iron Works instead of being taken to the Mare Island Navy Yard for that purpose.

MANY STRIKES

SUCCESSFULLY MET BY METAL TRADES ASSOCIATION.

Report Made on Principal Labor Dissensions of the Country—New Member National Council.

The National Metal Trades Association has successfully combatted recently with a total of 83 strikes, according to the monthly letter for July, which has just been distributed among the members of the organization. Summing up the condition of the various strikes, the association declares:

It is a hopeful sign that the failure of each strike opens the eyes of a large number of workingmen to the folly of belonging to an organization which is antagonistic to the mutual interests of employer and employe.

That a large body of men, many of them disposed to be fair and, presumably at least, preferring steady work at good, fair wages to idleness, should consent to yield to imperative commands of irresponsible leaders, seems the height of absurdity. Yet the situation, as demonstrated by the number of strikes the association has combatted within the past 30 days, forces the admission that we are confronted by positive conditions and not by college-bred theories.

The association makes the following report on the various strike situations:

St. Louis.—A strike was called on May 1 because of the refusal of the members of the St. Louis branch of the National Metal Trades Association to accord recognition to the local machinists' business agent. Eighteen plants were involved. A corps of employment agents was at once sent to various labor centers with the result that a number of men were secured, who placed the affected members in a position to withstand further onslaughts. The former employes of quite a number of the members returned to work on precisely the same terms which existed previous to the calling of the strike, not the slightest concession having been granted them. As a result of the successful outcome of the strike on the part of the association, the following St. Louis manufacturers have filed application for membership: Excelsior Tool & Machine Co., Dorris Motor Car Co., St. Louis Screw Co., East St. Louis Locomotive & Machine Shop Co., Fred J. Swaine Co., Mound City Machine & Pattern Co., Missouri Malleable Iron Co.

Pittsburg.—A strike was called in this city on April 23, because of the refusal of the members of the Pittsburg branch to grant a 50-hour week, a minimum rate of wage of 40 cents per hour and a 10 per cent increase in pay. Later the men proposed to accept a 10 per cent increase in pay and say nothing for the time being of the minimum wage or the change in working hours. A large number of men have already returned to work on identically the same basis as that which prevailed before the strike.

Cleveland.—The machinists' strike called in Cleveland on June 3, affecting nearly 2,000 workmen, is now a closed incident, and was a dismal failure on the part of union leaders. Thirty plants were involved in the strike, called because of the refusal of employers to grant the establishment of a minimum rate, a nine-hour day and a 10 per cent increase in wages. With the exception of one plant, nearly all are now operating with the usual number of workmen and three of the plants have arranged to increase their working force by the addition of a night gang.

Westfield, Mass.—A strike was called in the Westfield factory of the Pope Mfg. Co., because of that company's refusal to discharge an employe whom some of the other employes disliked. A sufficient number of workmen were secured by the association to put the plant in working condition within a short time from the inception of the trouble. It was continued but a few days.

Minneapolis.—On May 1 a strike was called in this city against the Diamond Iron Works, in spite of the fact that prior to the command to strike, the company had granted its employes both an increase in pay and a nine-hour day. The shop committee objected to the employment of two men and ordered a strike because of the company's refusal to grant their discharge. The strike has proven a failure.

Franklin, Pa.—On May 29 a strike was called in the shops of the Chicago Pneumatic Tool Co. and the Colburn Machine Tool Co. because of their refusal to establish a minimum rate, recognize the shop committee and other general union conditions. Arrangements were immediately effected by the association to secure men to take the places vacated by the strikers.

Toronto, Ont.—A demand for a nine-hour day, the establishment of a minimum rate higher than the present pay, and a wage increase having been refused by the association members, the Polson Iron Works and the William R. Perrin Co., a number of machinists in the employ of these two companies struck. Places vacated by the strikers are now being filled by competent workmen.

Chicago.—One hundred and thirty-five machinists in the employ of the Allis-Chalmers Co., Chicago, went on a strike May 16 because of the refusal of the company to grant a minimum rate of wages. The strike was given immediate attention by the officials of the Chicago branch of the association and the situation is now very satisfactory to the employers.

Indianapolis.—On June 22 the brass polishers and buffers in the employ of the Keyless Lock Co. struck because of the company's refusal to allow them to conduct the polishing and buffing department in a manner to suit themselves. The places vacated by the strikers were filled within two days.

Scranton, Pa.—On June 17 the Scranton Forging Co. was struck by the employes in the drop forge department because their demands had been refused. Arrangements are being made to supply the company with operatives to fill the places vacated by the strikers on July 15, when the company will be ready to resume operations.

Announcement is made by the association that J. Philip Bird, of the Hobbs Mfg. Co., Worcester, Mass., who was elected by the Boston convention to succeed Charles E. Hildreth as a member of the administrative council, has presented his resignation because of his severing his connection with the Hobbs company. President M. H. Barker has submitted to the administrative council the name of John R. Back, of the F. E. Reed Co., Worcester, Mass., to succeed Mr. Bird.

FOREIGN ORE AND PIG IRON RECEIPTS.

The extent to which America still makes use of foreign material was strikingly shown recently in a single day at Philadelphia, when four steamships arrived with 20,000 tons of iron ore and pig iron. Of the ore 6,500 tons came from Carthagena, Spain, in an Italian vessel, and 4,250 tons from Wabana, Newfoundland, in a Norwegian steamship. The pig iron was brought from Middlesbrough, Eng., by the British vessels. Eastern furnaces use large quantities of foreign ore, which is brought in from Cuba, Sweden, Spain, the East Indies, Newfoundland and other countries. But for the heavy importations of English pig iron, many American industries would have had to cease during the scarcity of the last few months.

PERSONALS.

President Corey, of the United States Steel Corporation, is expected to sail for this country about July 13.

Philip Fosdick, vice president and treasurer of the Kern Machine Tool Co., Cincinnati, has gone on a European trip.

V. W. Delaney has been made superintendent of transportation and labor of the Youngstown Sheet & Tube Co., Youngstown, O., a position just created.

Murray Shipley, vice president and secretary of the Lodge & Shipley Machine Tool Co., Cincinnati, is enjoying his vacation on the coast near Gloucester, Mass.

Henry C. Hunter, secretary of the New York and New Jersey branch of the National Metal Trades Association, has returned from a six weeks' vacation trip to Europe.

E. S. Colver was elected secretary and treasurer of the Ralston Steel Car Co., Columbus, O., at the annual meeting, succeeding W. G. Boland, who declined re-election. Mr. Colver has been assistant secretary and treasurer.

James Oliver, a prominent plow manufacturer of South Bend, Ind., is lying seriously ill at his home and his life is despaired of. Mr. Oliver invented a method of chilling plows and has operated a large plant at South Bend.

Solomon Ginsburg has been elected president of the New York Car Wheel Co., Buffalo, succeeding Joseph H. Berry, deceased. W. G. Smith has also been chosen vice president and J. A. Venable secretary and treasurer of the company.

Oscar Winter, who for more than six years has been steam expert of the National Tube Co., Lorain, O., has opened a consulting office in the Rockefeller building, Cleveland, where he will give especial attention to expert work in steam engineering.

Joseph Bubie Bancroft has been elected president of the Draper Co., Hopedale, Mass., succeeding General William F. Draper, resigned. The position of vice president, formerly held by Mr. Bancroft, has been filled by the election of Frank J. Dutcher.

Niven McConnell, formerly president of the Donora plant of the Carnegie Steel Co., has become president of the McConnell Engineering & Machinery Co., Tacoma, Wash., which has succeeded to the foundry and machine shop business of the Puget Sound Dry Dock & Machine Co.

George Caverhill, president of the Montreal board of trade, and W. G. Ross, identified with the street railway system of that city, have been elected to the directory board of the Dominion Iron & Steel Co. They succeed F. S. Pearson, of New York, and E. R. Wood, of Toronto.

James W. Van Cleave, president of the National Association of Manufacturers, was painfully injured by flying glass when his automobile collided with a street car in St. Louis recently. Other members of Mr. Van Cleave's family, who were with him in the automobile, were also slightly injured.

Harry Scott Braman, chief blower of the blast furnaces at the Ohio works of the Carnegie Steel Co., Youngstown, O., has resigned to become general superintendent of furnaces for the Youngstown Sheet & Tube Co., a position that has just been created. Mr. Braman has already taken charge of the Alice furnace, Sharpsville, Pa.

George L. Reis, vice president and general manager of the Minnesota Steel Co., is at present at Duluth, looking over the site of the new plant and considering the type of steel mills to be installed. The report that the Corporation contemplates the erection of a steel car plant at this place, widely circulated in the daily press, is of course without foundation, inasmuch as the Duluth plans do not include a plate mill.

E. H. Gary, chairman of the directory and finance boards of the United States Steel Corporation, sailed Tuesday for Europe. It is his intention to be gone about two months, and no further meeting of steel rail manufacturers and railway officials to consider the rail controversy will be held until after his return. Judge Gary states that the business of the corporation during the first half of the year was fully equal to that during the corresponding period of 1906 and that the June just ended was better than June, 1906.

OBITUARY.

Bowen Whiting Pierson, a manufacturer of machinery with offices at 95 Liberty street, New York, died July 4 at Bridgehampton, L. I. He was 49 years old and was born at Victor, N. Y. In the manufacturing field he was secretary and treasurer of the Alberger Condenser Co., and a director and treasurer of the Newburgh Ice Machine & Engine Co.

John I. Jones, for a number of years at the head of the pattern department at the Berwick plant of the American Car & Foundry Co., died recently at his home in that city.

Roger J. Sullivan, secretary of the Wayne Automobile Co., Detroit, died at Mt. Clemens, Mich., July 2, aged 39. Mr. Sullivan had been under treatment for rheumatism at Mt. Clemens.

Major Lewis M. Buford, one of the founders and vice president of B. D. Buford & Co., plow manufacturers, Rock Island, Ill., died on a train at New Haven, Conn., June 29, while sojourning in the east. The firm of B. D. Buford & Co. is now a part of the Rock Island Plow Co. Major Buford was 67 years of age.

George Rowland, mechanical engineer for the Consolidated Iron Works, and son of the president of this concern, died Monday at the home of his father in Larchmont, N. Y. He was about forty-two years of age and was a member of the A. S. M. E.

John S. Wilbraham, secretary and treasurer of the Wilbraham-Green Blower Co. of Philadelphia, died suddenly July 5 in Edinburgh, Scotland, while traveling for the benefit of his health. He sailed on June 13, intending to pass a long time abroad. Mr. Wilbraham, who was 48 years old, was a son of Thomas Wilbraham, who 50 years ago established the foundry which has been carried on by his children ever since.

SHIP YARD TROUBLE.

The Great Lakes Engineering Works has been compelled to close its St. Clair, Mich., yard, owing to the impossibility of getting sufficient labor to operate it profitably. Fortunately the character of the work under way at the yard is not such as calls for immediate delivery, and the company will therefore not suffer any loss of business thereby. The principal work under way at this yard at present is the manufacturing of the tubing for the Detroit river tunnel. Some slight labor trouble has marked the operation of the Cleveland yard of the American Ship Building Co. during the past week, though the men a week ago voted to return in a body. They were being taken back as fast as the company could make room for them, but apparently not fast enough to satisfy the men. The trouble is not serious.

Strike is Past.—The strike of machinists at Cleveland is now a matter of history, the men having returned to the shops of the Long Arm System Co., which was the last plant upon which the fight for higher wages and shorter hours was made. The company has taken back those of the former employes whom it desires. After Monday, July 15, all the plants which were affected by the strike will again be in full operation.

LARGE CAPACITY GIVES JUNE BIG IRON OUTPUT

Because of the increased number of stacks in operation over previous months, June was enabled to present a splendid record of pig iron production in respect to aggregate tonnage. The total output of the United States for the 30 days of June reached 2,237,420 tons, compared with 2,291,030 tons in the 31 days of May, and 2,226,708 tons in the 30 days of April.

Had the past month contained the same number of days as May, the high record of production which was established by the latter month would undoubtedly have been broken. The daily average production of June reached 74,581 tons, against 73,904 tons in May, and 74,233 tons in April. The decrease in total production of 53,610 tons shown by June as compared with May would, therefore, more than have been made up by a single additional day. Foreshadowed by the average daily capacity of the furnaces in blast on June 30, when the total was 75,258 tons, as compared with 72,961 tons on May 31, the month of July starts upon a period of unusually large production, provided this record of daily output is maintained.

June's good showing can be attributed wholly to the large increase of active stacks over May, as the figures were 341 and 329 furnaces respectively, a gain for the month just passed of 12 stacks. Included in this increase were the two new furnaces blown in during the month, the Perry No. 1 of the Perry Iron Co., Erie, Pa., and the Carrie No. 6 of the Carnegie Steel Co. There was a tendency shown by operators, according to the month's figures, not to push their plants to equal the May figures of heavy output, and a comparative survey of the same furnaces under equal conditions both in May and June displays a less production in the latter period.

Of the 2,237,420 tons produced in June, 1,472,966 tons represent the output which was consumed in the plants of the producers, while 735,001 tons were turned out by merchant plants for general market demands. The accompanying table shows the month's output by states and groups of states.

JUNE FURNACE REPORT.

STATE	NO. OF STACKS	NO. IN BLAST ON LAST DAY OF MONTH		PERCENTAGE OF TOTAL POSSIBLE OUTPUT MADE	AV. DAILY CAPACITY IN BLAST LAST DAY OF MONTH	ACTUAL TONNAGE MAKE		TOTALS	
		MAY	JUNE			MERCHANT	NON-MERCHANT	MAY	JUNE
Pennsylvania	154	133	141	89.8	33,882	241,598	757,069	1,019,860	998,667
Ohio	60	56	58	94.4	15,590	148,604	308,476	472,189	457,080
Alabama	46	30	31	64.0	4,638	112,994	19,556	151,665	132,222
Virginia	23	19	17	75.8	1,386	42,640	———	46,225	42,640
New York	22	18	17	77.3	4,702	57,231	83,812	137,029	141,043
New Jersey	9	8	9	100.0	1,082	32,460	———	30,099	32,460
Illinois	24	23	24	97.4	7,500	24,476	194,567	216,987	219,043
Tennessee	18	12	14						
West Virginia	4	4	4	71.6	2,548	41,201	30,148	73,097	71,349
Kentucky	8	6	5						
Maryland	4	4	4						
Wisconsin	6	5	5	93.7	3,054	12,265	79,338	89,198	91,603
Colorado	6	5	6						
Georgia	2	1	1						
Texas	2	1	1						
Minnesota	1	1	1	72.5	876	21,780	———	22,254	21,780
Michigan	2	2	2						
Missouri	1	1	1						
Spiegel—All states								16,095	19,736
Ferro—All states								16,334	9,717
Totals	392	329	341	——	75,258	735,001	1,472,966	2,291,030	2,237,420

BLAST FURNACE NOTES.

The Hattie Ensley furnace of the Sloss-Sheffield Steel & Iron Co., Birmingham, was out 27 days during June.

The Northern furnace of the Northern Iron Co., Port Henry, N. Y., which has been out of blast some time for repairs, will go in about July 10.

One of the stacks of the Eliza group of the Jones & Laughlin Steel Co., Pittsburg, went out about the middle of June, and was still out at the beginning of July.

The Perry Iron Co., Erie, Pa., blew in its new stack Perry No. 1, June 16, and the first iron was taken from the furnace June 17.

The United Iron & Steel Co., Pittsburg, will improve its Fannie furnace by the installation of a McClure stove 27 x 70, and a Mullin gas washer. A McClure stove 22 x 85 will also be put in at the Cherry Valley plant. The gas washer at the Fannie furnace is a duplicate of the original washer put in at the Cherry Valley furnace in 1905.

The Rockdale Iron Co., Rockdale, Tenn., blew in its Rockdale furnace June 1.

The North Works furnace No. 1 of the Illinois Steel Co., which has been out for repairs, blew in June 20.

Carrie No. 6, the new stack of the Carnegie Steel Co., at Rankin, Pa., was blown in June 6. One of the Edgar-Thomson stacks of the company, which has been out of blast for some time, was also blown in June 14, putting the entire battery of 11 furnaces in action. The Carnegie Steel Co. now has every one of its stacks in operation, with the exception of one of the Mingo furnaces.

The Cranberry furnace at Johnson City, Tenn., of the Cranberry Furnace Co., which has been out for relining, was blown in June 23.

THE TEMPERATURE OF COKE OVENS.

Experiments have been conducted at the Semet-Solvay coke ovens, belonging to the Bridgewater collieries, Lancashire, Eng., with a view of ascertaining the temperatures of the charge. A Roberts-Austen electrical pyrometer was used and readings were taken of the temperature in the exact center of the charge. From the time the retort was charged, at 1 p. m. until 10 p. m., the temperature did not rise over 100 deg. C. The temperature then rose at midnight to 200 deg. C. At 1 a. m. it had risen to 350 deg. C., at 2 a. m., to 530 deg. C., at 3 a. m., to 600 deg. C., at 4 a. m. to 700 deg. C., at 5 a. m., to 820 deg. C., at 6 a. m. to 900 deg. C., and at 7 a. m. to 920 deg. C. The increase during the next four hours showed a slow rise to 1,000 deg. C., at which time, 11 a. m., the coke was discharged.—*Engineering and Mining Journal.*

THE BLAST FURNACE. V.

FLUXING.

BY HORACE ALLEN

As all the crude minerals from which pig iron is manufactured, or smelted, in the blast furnace, as well as the fuel and fluxes required, are contaminated with impurities, the chemical composition of all the materials entering the furnace must be ascertained to enable the smelter to so constitute the charge that a certain quality of iron is produced. Table I includes most of the constituents entering into the composition of iron ores, and the proportions in which they leave the furnace as either metal, gas, or slag.

The chief constituents which do not leave the furnace as either metal or gas, are silica, alumina, lime and magnesia, the remainder being only present in small proportions usually, and as they are of themselves practically infusible at any temperature developed in the furnace, unless provision were made for rendering them liquid, their removal from the furnace would be almost if not quite impossible.

However, though silica, alumina, lime and magnesia are per se infusible, they are capable of combining in certain proportions and forming compounds which are readily fusible at the lower part of the blast furnace.

Silicic acid, silica, acts as an acid and chemically combines with lime, alumina, magnesia, etc., as bases, forming fusible salts; oxides of iron and manganese also act as bases towards silica, the different combinations having different degrees of fusibility. Most of the ores of iron have silica associated with them, and unless some other base than oxide of iron is provided there would be found a fusible compound of silicate of protoxide of iron, which would carry out as slag a certain proportion of the iron which would otherwise go to increase the output of pig iron.

There are some classes of iron ore, such as calcareous, limy, spathic carbonates, etc., which have the earthy impurities chiefly composed of the bases lime, magnesia, alumina, etc., in which case the requisite proportion of acid, silica, must be provided by either employing a mixture of ores, with acid and basic impurities, or else charging a proportion of sand as flux.

Knowing the proportions of the acid and bases in the ore and flux, and those necessary to form the most fusible slag, it would be a comparatively easy matter to adjust the weight of flux to the charge. But, there are other conditions which complicate the matter and render the most readily fusible slag unsuitable.

In table I, constituents of ore and fuel, it will be noticed that in the case of phosphorus and sulphur, the former passes into the pig iron, but the latter into both pig iron and slag.

In the presence of a slag containing silica the phosphorus cannot be prevented from associating with the reduced iron, by any modification of the proportions of the slag forming ingredients, but this is not the case with sulphur.

When it is required to keep down the percentage of sulphur in the molten metal, the proportion of bases to acid in the slag must be raised considerably above that required for a readily fusible compound, and even if the percentage of sulphur in the ore is very low there is always such a proportion in coke that for high grade iron the slag must be very basic.

This brings about another complication for the very basic slag is apt to give trouble from its infusibility unless two or more bases are provided for combination wtih the silica, for as will be seen from the following, double silicates are more fusible than single silicates:

Single Silicates.

Silicate of lime (SiO_2, CaO) melts at 3810°-3900° Fahr.
Silicate of magnesia (SiO_2, MgO) melts at 3990°-4080° Fahr.
Silicate of alumina (SiO_2, Al_2O_3) melts at 4350° Fahr.

Double Silicates.

Silicate of lime and magnesia (SiO_2, CaO, MgO) melts at 3630° Fahr.
Silicate of lime and alumina (SiO_2, CaO, Al_2O_3) melts at 3480°-3540° Fahr.

So that while the double silicates are much more basic than single silicates they are also more readily fused.

If it is attempted to smelt a siliceous ore without the addition of any

Table I.

Entering furnace. Constituents.	Molecular Symbol.	Leaving the furnace as— Metal.	Gas.	Slag.
Iron ores.				
Ferric oxide	Fe_2O_3	Iron	Oxygen	
Ferrous oxide	FeO	Iron	Oxygen	
Manganic oxide	Mn_3O_4	½ Manganese	Oxygen	½ Manganese
Manganous oxide	MnO	½ Manganese	Oxygen	½ Manganese
Alumina	Al_2O_3			Alumina
Lime	CaO			Lime
Magnesia	MgO			Magnesia
Potash	K_2O			Potash
Soda	Na_2O			Soda
Carbonic acid	CO_2		Carbonic acid	
Silica	SiO_2			Silica
Phosphoric acid	P_2O_5	Phosphorus	Oxygen	
Sulphuric acid	SO_3	Portion Sul.	Oxygen	Portion Sul.
Pyrites	FeS_2	Iron		Portion Sul.
Combined water	H_2O		Water	
Moisture	H_2O		Water	
Fuel.				
Carbon	C		Carbon	
Sulphur	S	Portion Sul.	Portion Sul.	Portion Sul.
Ash (earthy matter)	Fe_2O_3, SiO_2, Al_2O_3, CaO, etc.	Iron		SiO_2, Al_2O_3, CaO, etc.
Moisture	H_2O		Water	

fluxing material the silica will combine with some of the oxide of iron according to the chemical formula SiO_2, FeO, where 60 parts of silica will engage 72 parts of oxide of iron (of which 56 parts would be the equivalent of metallic iron) and though this compound will form a fusible slag (melting at 3,450 degrees Fahr.) there will be a serious loss of iron in the slag and any sulphur present in the charge will be found in the pig iron.

As lime has a greater affinity for silica than oxide of iron, the addition of limestone to the charge will prevent the loss of iron as stated above, and if the proper proportions of bases are arranged to form double or triple silicates the slag will be fusible while sufficiently basic to render the pig iron nearly free from sulphur.

From an examination of different varieties of slag produced by blast furnaces using ores of different classes, with fuel of varying sulphur content, it has been found that the proportion between oxygen in the bases to the oxygen of the silica forms a good guide as to the most suitable slag for giving high grades of iron, and enables comparisons to be readily made.

With pure ores smelted with charcoal the slags produced have approximately the following formulae:

(1) Silicate of lime and tri-silicate of alumina $CaO\ SiO_2 + Al_2O_3\ _3SiO_2$; oxygen in bases to oxygen in silica 1 to 2.

(2) Bi-basic silicate of lime and bi-basic subsilicate of alumina 3 ($2\ CaO\ SiO_2$) + $2\ Al_2O_3\ 3\ SiO_2$ oxygen in bases to oxygen in silica 1 to 1, giving a percentage compositon of

	(1)	(2)
Silica	60	40
Lime	14	37
Alumina	26	23
Total	100	100

The average chemical composition of slag from blast furnaces smelting hematite ores with high quality coke and limestone flux, and producing Bessemer pig iron was

Silica	38.90
Alumina	11.68
Lime	45.32
Oxide of iron	2.22
Sulphur	1.30
Total	99.42

where the oxygen in the bases to oxygen in the silica was 1 to 1.09.

The chemical formula for a good quality of slag suitable for Bessemer pig iron, with good coke and limestone flux is 3 (SiO_2 2 CaO) + SiO_2 Al_2O_3 where the percentage composition is

Silica	37
Lime	48
Alumina	15
Total	100

According to the proportion of oxygen in the different bases the equivalent weight of each to replace one another may be found as

Lime - - -	Ca O 40 16 56	56 parts of lime are equivalent to
Magnesia -	Mg O 24 16 40	40 parts of magnesia, or
Protoxide of Iron -	Fe O 56 16 72	72 parts of oxide of iron, or
Protoxide of Manganese	Mn O 55 16 71	71 parts of oxide of manganese or
Alumina - -	Al_2 O_3 27x2 16x3 102	34 parts of alumina

and to facilitate the calculation of the quality and weight of the flux required, the writer has prepared the following table:

Selecting, for example, the ratio 1 : 1.2 we find that one-half of the manganous oxide usually passes into the slag, and $\frac{MnO}{2} \times 0.506$ will give the weight of silica required to flux it.

1 : 1.2, or 1 : 2, which will determine which column of factors is to be employed.

Table II.—Fluxing Table for Blast Furnaces.

	Symbol	Molecular Weight	Oxygen in base to O in SiO_2						
			1 to 1			1 to 1.2	1 to 2		
			Proportion and Flux	Equivalent Weight	Factor	Factor	Proportion and Flux	Equivalent Weight	Factor
Manganous oxide	MnO	71	$\frac{Si\ O_2}{2}$	$\frac{60}{2}=30$	0.422	0.506	1 $Si\ O_2$	60	0.845
Alumina	Al_2O_3	103	1.5 $Si\ O_2$	$60 \times 1.5 = 90$	0.873	1.047	3 $Si\ O_2$	$60 \times 3 = 180$	1.747
Lime	CaO	56	$\frac{Si\ O_2}{2}$	$\frac{60}{2}=30$	0.536	0.643	1 $Si\ O_2$	60	1.071
Magnesia	MgO	40	$\frac{Si\ O_2}{2}$	$\frac{60}{2}=30$	0.750	0.900	1 $Si\ O_2$	60	1.500
Silica	SiO_2	60	2 Ca O or	$56x2 = 112$	1.866	1.555	1 Ca O	56	0.933
			2 $Ca\ CO_3$	$100x2 = 200$	3.333	2.777	1 $Ca\ CO_3$	100	1.666

This table is for use when a new class of iron ore, or mixture, is about to be employed, when the following method of application is to be adopted to ascertain the quantity and proportion of flux to be ued.

Being provided with a complete analysis of the ore the usual calculations must be made to determine the yield; then, according to the proportion of silicon desired in the pig iron, the equivalent weight of silica must be determined and subtracted from that associated with the ore, or to be provided by the flux if the ore is non-siliceous.

Then it must be decided whether the slag shall be of a readily fusible quantity or that the sulphur in the pig iron is to be kept low, and the ratio of the oxygen in the base to that in the silica selected, either 1 : 1,

The whole of the alumina passes into the slag and if the percentage of this is multiplied by 1.047 it will give the weight (in percentage of the ore) of silica for flux.

In the same way the percentage of lime must be multiplied by 0.643, and the magnesia by 0.900.

To the sum of these weights of silica must be added the weight of silica to provide for the silicon in the pig iron to be produced.

If the total silica, as found, is in excess of that contained in the ore then the difference must be added, in the form of sand, to the furnace charge, but if the silica in the ore is

in excess then it is necessary to deduct the silica required from that contained in the ore, and multiply the difference by 2.777 which will give the weight of limestone to be added to the charge.

The results of this calculation not only give the proportion of fluxing material to be employed, but also the weight and composition of the resulting slag.

MISTAKES IN DESIGN AND CONSTRUCTION OF AMERICAN LATHES.

By Robert Grimshaw.

I desire, in the interest of my fellow countrymen, to call attention to some faults of design and construction in certain lathes delivered in Europe, and which militate against the success of all American machine tools.

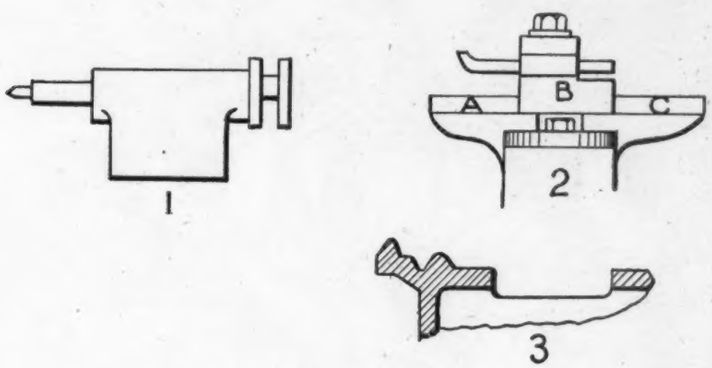
Naturally there are sold over here some first class tools, and some very bad ones; others again have some good points combined with some bad ones. It will do all makers good if I call to their attention some of the details of a build of lathes (makers' name not necessary to mention) that would give better satisfaction if they were other—that is better—than they are now.

In the first place, probably following the advice of E. W. Bliss of some years ago—also, I believe, of Oberlin Smith—the headstock is extraordinarily strongly built; admirable in itself, but the head is too stout for the rest of the lathe, which is really lightly put up. When I say "lathe" I mean the entire set of the same type, from 16 inches swing upwards.

The speed changes are effected by means of clutch couplings within the live head, and managed by a hand lever. There is no stepped gear. This is very good and convenient, but unfortunately the change from slow to fast speed can not be made when running. In order to effect this change, the lathe must be stopped and the driving arbor turned slowly by hand until the clutch engages. Another form of coupling would do away with this difficulty. The change from fast to slow can be effected all right enough.

The tail stock is too light, so tnat if the cut is a bit unevenly distributed around the periphery, the dead-center bends (Fig. 1). This naturally produces work that is not truly circular in cross section.

But the worst is yet to come. (See Fig. 2.) When the tool post is run back clear to the left, which is the only position in which it is possible to turn clear up to the live center, the part *a* bends. Running back to the middle position shown at *b* is not practicable, because then the dog strikes against the end *a*. This difficulty can be done away with by turning the post through 90 degrees, but this is only possible in turning small pieces; with large ones it will not work. It would perhaps be better to do entirely with the extension *a* and to prolong the end *c* so as to get the necessary length of tool feed.



Mistakes in American Lathes.

The tailstock is too weak for the stout headstock, and the construction of the tool rest is neither practical in design nor light enough in construction. Also the bed cross section (see Fig. 3) could be a bit wider with advantage to the entire tool, and with very slight increased weight and cost to the manufacturer.

The Colonial Foundry & Machinery Co., Worcester, has discharged its employes and the plant has been indefinitely closed. For upwards of a year the concern has been operated by five trustees, acting in the interests of the creditors. During this period the earnings have been sufficient to pay the interest on the company's outstanding obligations, but not large enough to reduce the total indebtedness.

A LARGE BOILER ORDER.

The Lake Erie Boiler Works, of Buffalo, N. Y., has completed a large boiler contract and in doing so has proved how an inland concern can manufacture for ocean trade. It also shows the importance of the Erie canal as a connecting link with the coast. The boilers were shipped last week via the canal to New York, whence they will be conveyed to their respective destinations on the Atlantic coast.

The contract called for the delivery of the boilers early in July, and the work was not begun until Feb. 1. Twelve of the boilers weigh 50 tons each, tested to carry 180 pounds of steam. They measure 12 feet 6 inches diameter and 12 feet in length, each having three 42-inch corrugated furnaces. In the same order were three dunkies, 10 feet diameter and 10 feet long. Each of the dunkies has two 36-inch corrugated furnaces. These boilers are also tested to 180 pounds, all built under federal regulations.

All the boilers go to Quincy, Mass., where they will be delivered to the Fore River Ship Building Co., which will install them in colliers now building for ocean service. Much interest was shown in Buffalo in the completion of the order and the loading of the boilers on canal boats. Crowds gathered at the Ohio basin where the loading took place, and the management naturally took a keen interest in the successful completion of the contract.

Two boilers equally large have been built at the same plant which will also go to Quincy for contract No. 144, a large lumber trade boat. These boilers are 12 feet 6 inches diameter and 12 feet long, tested to 180 pounds. Three others were built for the Eastern Dredging Co., of Boston, each 10 feet in diameter, 10 feet long, and tested to 150 pounds. In the same order are two rectangular fire box boilers for ocean tugs. Two boilers are now building for the Great Lakes Engineering Works, Detroit, and will be placed in hull No. 35, which is one of the new ships for the Western Transit Co., of Buffalo. These boilers will be 14 feet 10 inches diameter and 12 feet long, tested to 210 pounds pressure, and having shell plates 15/8 inches thick, each boiler weighing 60 tons. The Lake Erie Boiler Works, and the Lake Erie Engineering Works, both of Buffalo, are under the same management.

The summer meeting of he American Institute of Mining Engineers is to be held in Toronto, Cobalt and Sudbury, July 23-29.

THE FOUNDRIES OF THE ATLAS ENGINE WORKS, INDIANAPOLIS

The foundries of a plant which employs 2,000 men and turns out an engine and boiler for every working hour of the day must necessarily be large. Those of the Atlas Engine Works occupy two buildings, one for the light castings and one for the heavier cylinders, fly wheels, engine beds, etc. Both buildings are long and narrow, so that the light from the side windows easily reaches the center of the foundry, the light castings department being 65 x 300 feet and the heavy castings foundry 500 x 120 feet. In the smaller foundry, an average of 50,000 pounds of iron is melted for each pour and in the large foundry about 125,000 pounds.

FIG. 1.—INTERIOR OF THE SMALL CASTINGS FOUNDRY.

Light Work Foundry.

A view of the foundry for small castings where are made the dogs, hand hole plates and other light castings for the boilers, as well as all of the small engine castings, is shown in Fig. 1. The building is of the single monitor style and the excellent lighting argues strongly for the long narrow foundry where ground space and distributing facilities permit. A minimum of hand labor is required here, for the molding is all done on machines, and, as shown in Fig. 1, the handling of flasks, molds and metal is accomplished by means of air hoists running over an elaborate system of overhead trolleys which cover every square foot of the foundry. To indicate how thoroughly accessible the entire floor space is from this trolley system requires but a moment's inspection, for there are in the width of the building eleven parallel runways traversing the length of the building with innumerable cross-overs.

The center aisle runs the entire length of the foundry, with the molding floors on either side. The flasks are laid out regularly in rows under the trolleys with small alleyways between each two rows of flasks for the operator of the hoist. The molding machines, eight in number, are located conveniently along either side wall. They are of the stripping plate type, built by the one time Pneumatic Co., of Indianapolis. A view of one of the machines is given in Fig. 2, which shows that it consists of three essential parts located on a central shaft. On one side of the shaft is the plate for the cope half of the pattern and on the other the drag. These two plates can be rotated about the shaft to bring each in turn under the compression plate, which, operated by compressed air, rams the sand in the mold.

It will also be seen from this view of the molding machine that a labor and time-saving arrangement has been installed for the handling of the sand. Alongside of the molding machine is a rotating hexagonal sand screen, from which the sand falls into the endless bucket conveyor shown, and is carried to a hopper directly above the molding machine. At the mouth of the hopper spout and within the reach of the molding machine operator is a valve by which he controls the amount of sand required. The distance through which the sand falls packs it around the pattern evenly and to just the desired degree. The molding operation, therefore, is very simple. A hoist drops a flask on one of the stripping plates, the sand falls into the mold, which is then rotated under the ram, the other flask being filled in the meantime. While the second flask is being rammed, the first is being carried down the floor. The molding machines vary in size, there being two 16 x 16-inch turning out 180 molds a day, two 24 x 24-inch making 117 molds a day, two 32 x 42-inch making 30 per day and two 44 x 60-inch making 18 a day.

Two cupolas, 74 inches in diameter, are located on one side of the building midway between the ends. The hot metal is distributed in 700-pound ladles suspended by block and tackle from the trolleys, the ladles being manipulated by hand. The methods used in this foundry make possible a neatness and orderliness seldom found in the foundry end of a plant, but here evident to a marked degree.

The two foundry buildings are situated 50 feet apart and end to end. Between the two buildings and with its runway extending at right angles to the buildings over to the shipping yard a 15-ton Alliance Machine Co. yard crane has been erected, by which the foundry is placed in touch with the entire expanse of the yard and castings run out of the end of the building on small flat cars can be picked up by the crane and placed within reach of any part of the plant.

The Heavy Work Foundry.

The large foundry is also a one-story building, but has two monitors. Here, too, a part of the floor is covered by the trolley system where the lighter castings are to be handled, but, in addition, each of the three center bays are supplied with two 10-ton cranes, built by Pawling & Harnischfeger, Milwaukee, and also by individual air hoists, which vary in size from 6 to 16-inch.

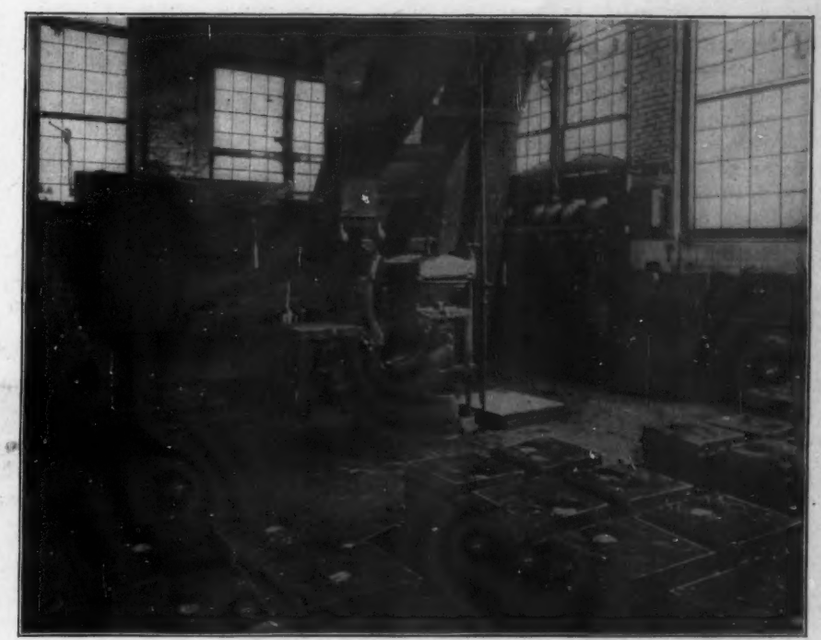


FIG. 2.—ONE OF THE SMALLER MOLDING MACHINES SHOWING SAND HOPPER AND ELEVATOR.

In this foundry, shown in Fig. 3, as well as in the other, most of the work is done by machine. Some of the Pneumatic Co.'s rotating machines are used, but of particular interest is the semi-mechanical arrangement devised by the Atlas Co. and particularly adapted to the large amount of engine bed castings required where, in addition, great numbers of the same size engines are turned out. One section of the floor is devoted to the casting of bed plates. For the molding of each bed two shallow, oblong pits are dug of a size corresponding to the flask in which the molds are to be made. One pit is for the cope and the other for the drag. The drag flask is supported over its pit on trunnions, so that it is able to rotate. The pattern is set in the bottom of the flask, parting face down and the sand is rammed in around it. When the mold is ready for the drawing of the pattern, it is rotated to bring the pattern side up, permit-

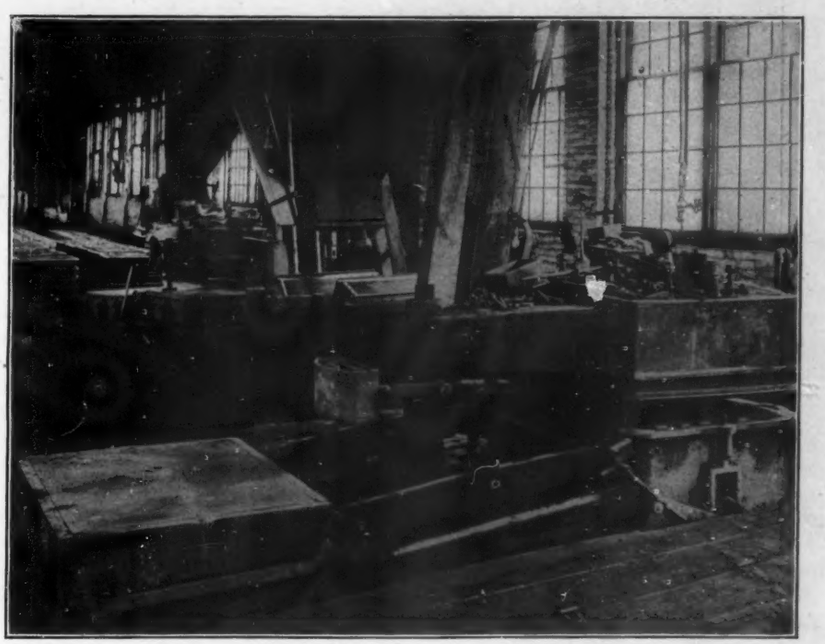


FIG. 3.—ONE OF THE LARGE MOLDING MACHINES.

ting its easy withdrawal. The cope flask is prepared somewhat differently. In this pit, the pattern rests on two pneumatic pistons, by means of which the pattern can be raised and lowered. The flask is set over the pattern, resting on the sides of the pit, the pattern is lifted up into the flask and the sand rammed around it. The pattern is then withdrawn by releasing the air pressure on the pistons. The two halves of the mold can then be brought together for casting.

The molding is all green sand work and the facings are dried by portable oil burners brought to the mold. Metal flasks are used almost altogether. Both of the cupolas are 84 inches in diameter and the blast is supplied by two Connersville blowers driven direct from one motor.

A separate building alongside of the foundry is devoted to cleaning the castings. This provision avoids much of the dust usually incident to foundries and aside from the better ventilation made possible by such an air arrangement, a noteworthy improvement in the lighting results from the clearer atmosphere. The rumblers, eight in number, are arranged in a row in one wing of the building. A track parallels them to facilitate the handling of the castings, and a track scale at the entrance records the finished weight of all material.

A new all-steel tie has been invented by Thomas A. Galt, of Sterling, Ill. It comprises a pair of channels, the flanges facing each other. Between the channels are placed two blocks of wood 2 feet long and 8 inches wide, which form the rail bearing. The channels are clamped on the blocks by means of bolts, and the rail is spiked to the wood. To obviate outward pressure on the tie an anchor is driven into the ground at the ends.

A special meeting of the American Society of Mechanical Engineers will be held in New York, Oct. 8, to act on a proposed merger of the society with the Mechanical Engineers Library Association.

FIG. 4.—VIEW DOWN MIDDLE BAY OF FOUNDRY FOR HEAVY CASTINGS.

THE HESKETT-MOORE DIRECT FURNACE FOR STEEL PRODUCTION.

In THE IRON TRADE REVIEW of June 20, the report of Consul O. H. Baker, Sydney, Australia, on the Heskett-Moore process of iron and steel production was presented. We are able in this issue to give the description and drawings of the furnace used in connection with this process.

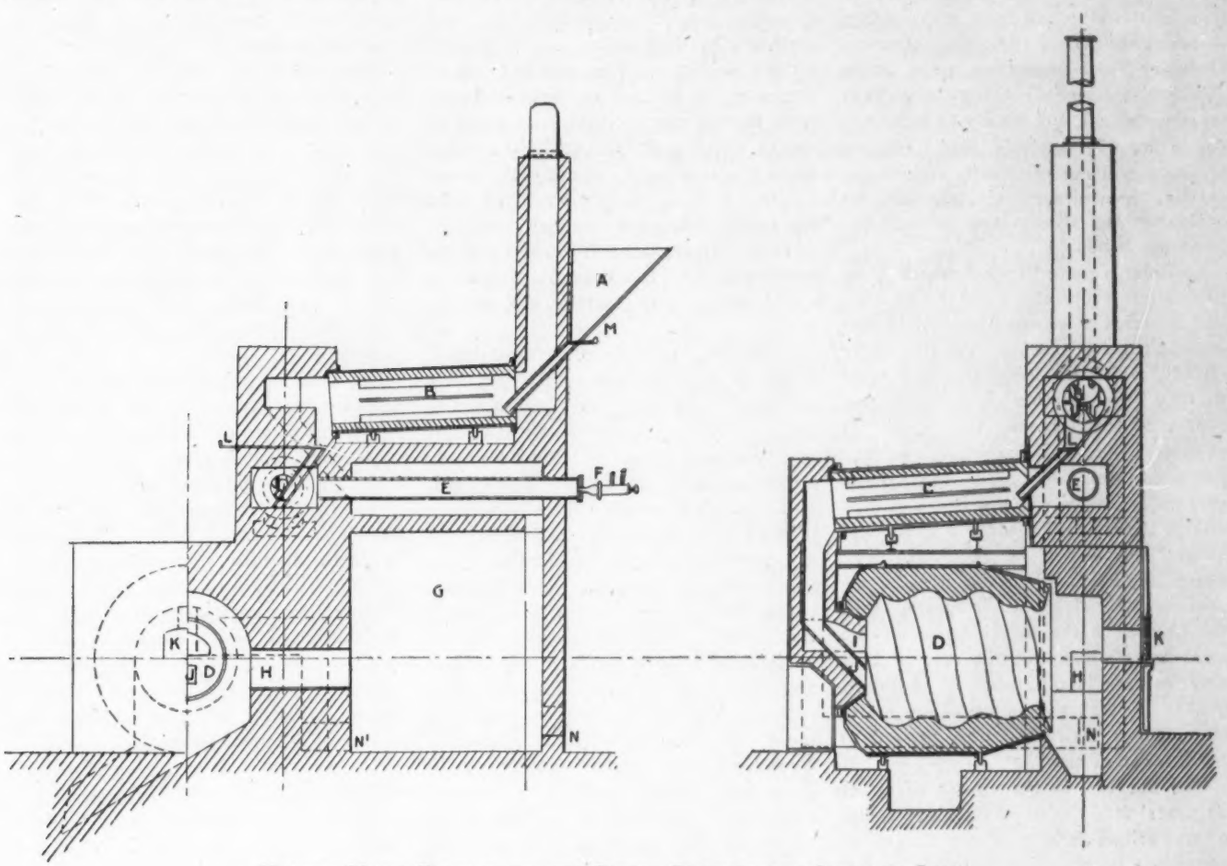
Referring to the accompanying illustration, the essential features of the furnace are the heating chamber B, a reduction chamber C, and a melting or balling chamber D, which is revolvable. In connection with this furnace, there is also used a gas producer apparatus and air heating regenerators. The operation of the furnace is as follows:

The ore is first pulverized and concentrated until practically a pure oxide of iron is obtained. This is then automatically fed into the heating chamber B by means of a hopper A. On being brought into con-

tact with the highly heated waste gases from the melting chamber, the ore is raised to a temperature of about 650 degrees Cent. From the heating chamber, the ore is passed automatically by gravitation in a continuous stream to the second or reducing chamber C. In this chamber it meets the reducing gases from the gas producer, at the same temperature, under which conditions the finely divided ore becomes deoxidized to fine particles of iron. These are passed automatically by gravitation to the third chamber D. It should be noted that the temperature in the heating and deoxidizing chambers is not high enough to fuse the particles of iron and cause them to adhere to one another. An important feature of the process is that the fine particles of reduced iron pass into the melting or balling chamber through the gas port J and directly into a bath of molten metal or slag, which is kept in the bottom of this chamber. They are thus protected from reoxidation during their passage into the molten bath by the forced current of reducing gases, which forms a complete enveloping mantle. The high temperature necessary (1,800 to 2,000 degrees Cent.) to melt the iron for the production of steel is obtained by the complete combustion of the incoming gas with hot air from the regenerator G. The waste gases pass into the regenerator through a flue H, thence around the gas producer E and finally into the heating chamber B.

In the production of wrought iron, a temperature of about 1,500 degrees Cent. is maintained in the balling chamber D, which causes the particles to fuse together and the revolving action of the furnace automatically forms the particles of iron into balls in the bath of molten slag. They are then delivered to a squeezer, which compresses them into marketable iron. In the manufacture of steel, a temperature of about 2,000 degrees Cent. is maintained, and the particles of reduced iron are melted and form a liquid bath, which, by the addition of necessary alloys, is easily converted into any quality of steel required. It is, from time to time, drawn off into a ladle and is cast into ingots for subsequent hammering and rolling.

The advantages of the above process, as claimed by the inventors, are as follows: A saving of 80 per cent in initial cost is effected over the cost of construction of the blast furnace and a final saving of at least 50 per cent is accomplished. The saving in fluxes is stated to be about 75 per cent, since the iron ore is purified by concentration. The process is entirely automatic, thus reducing the labor cost materially, and it is stated that finished material can be produced in from three to four hours, as against 30 to 40 by the present indirect method. As the heating, de-oxidizing and melting are accomplished by the use of the pure gaseous fuel, any combustible carbonaceous material may be used, making the process available in localities where coal and coke are not to be had, except at high rates. No impurities are introduced into the metal from the ash or coke, as occurs in a blast furnace.



HESKETT-MOORE FURNACE FOR THE DIRECT PRODUCTION OF IRON AND STEEL.

The Canadian Pacific Railway has decided to construct 50 locomotives, exceeding in size any engine hitherto built in Canada, for use on the mountain division. Each engine will have a draw bar pull of 40,000 pounds, whereas the greatest tractive power of the present locomotive is 31,000 pounds.

PROPERTIES AND USES OF VANADIUM STEEL

In view of extensive interest attending the employment of vanadium in steel metallurgy the following points extracted from a lecture recently delivered by J. Kent-Smith before the association of automobile manufacturers in New York will be of practical use:

The most noticeable features of vanadium steels are not only their high tensile strengths but the close approach of the elastic limits to those tensile strengths and their great ability to resist shock and dynamic stresses. Ordinary steel possessing good static qualities, viz., good elongation, high tensile strength and ability to bend under a steadily applied load without breaking, will not necessarily endure under fast repeated work, viz., vibration accompanied by shocks and perhaps alternating bends.

Consider a piece of steel whose elastic limit is represented by the number 10. A series of stresses applied to this steel at regular intervals repeated fairly rapidly, which of themselves are equal to, say, the number 5, will in due course of time break the steel. If stresses of half this intensity are applied, the steel will also be broken eventually, but it will not break in just double the time. Probably a great deal longer period will be required. The nearer the intensity of the stresses approaches the elastic limit of the steel, the greater is the deterioration of the steel in question, but the rate of that deterioration is different in different grades of steel, and in vanadium steels its rate has been absolutely proved to be slowest of any.

The speaker, in the course of about 15 years' study of steels seldom found a mysterious failure where the cause could not be traced to dynamic stresses. In some cases, the cause might be static; at the same time, of course, the dynamic properties of the steel were also bad. In very many cases, static tests would show a high tensile strength and good chemical analysis, and yet the steel would not render the service which was required of it.

The art of automobile construction has done more to advance the subject of special steel than any one cause. The demands made on the steel in automobile service are drastic, and it is necessary that the material shall be of the best quality. A steel which will make an automobile spring will do for a spring for almost any purpose; a steel suitable for an automobile axle will render good service for any axle. Eighty to ninety per cent of the stresses met with in automobile service are dynamic, and the same condition, approximately, obtains in some steam engine parts. The speaker questions whether it is right to give the entire attention to the 10 or 15 per cent static stresses which may exist in machinery parts, and to let the 85 or 90 per cent dynamic stresses be taken for granted and as needing no provision for them. The average steel-maker should study the dynamic conditions under which the steel wil be used more and be guided by the results of these studies. It is preposterous to test a steel, which is to be used in a crank shaft of a gasoline engine running at 1,000 to 1,200 revolutions per minute, by exactly the same formula and method as would be used for steel I-beams or bridge construction, for the crank shaft is subjected almost entirely to dynamic stresses, while those in the bridge are largely static.

As noted above, the most remarkable property of vanadium steels are their ability to resist dynamic stress. The speaker's first experience with vanadium was in a piece of Swedish iron, which had done remarkably good work. In the static testing machine, this piece of steel gave results, which, while very good, were nothing wonderful. This iron contained a considerable amount of vanadium (most Swedish irons contain some). The speaker determined, at this time, to make a study of the application of vanadium to the steel industry, and at first obtained results of more or less indifferent character. Vanadium is an elusive element, and it does not follow that, if a certain amount of vanadium is put into a pot of steel, the vanadium goes into the steel, and the majority of the steel tests published until lately show the effects of certain additions. As an instance, a sample was obtained, which purported to show the effect of the addition of 0.5 per cent vanadium; as a matter of fact, the sample contained 0.17 per cent. The 0.5 per cent vanadium had been added, but not added properly. In the addition of vanadium to steel, there is a great re-arrangement in the static and dynamic properties of vanadium steels at the point of recalescence. Some of the bars mentioned above, to which the 0.5 per cent vanadium had been added had been finished cool; some had been annealed at blood heat; and some at bright cherry heat, etc. The static results, which were the only ones recorded, were naurally contradictory.

It is essential that most of the vanadium added to steel remains in it; if there is oxide left in the steel, the vanadium will scavenge it out, but vanadium is an expensive scavenger. The vanadium is desired in the steel in preference to doing anything else, because it is the easiest work. There is little use in adding vanadium to any oxidized steel, because analysis afterwards will not reveal any vanadium in the steel. This bears out the statement that it does not follow, because a certain amount of vanadium was put in the steel, that it will be found there. It is at this point that so many of the earlier results obtained with vanadium steel went wrong; the vanadium was simply put into the steel, no consideration being given to the oxidation of the steel itself or to the oxidizing conditions which were concomitants of the vanadium addition and the vanadium did its easiest work first, which was to unite with the oxygen in the contained oxides.

On deducing these facts, the speaker determined to study afresh the entire subject of vanadium steel, it being fully recognized that dynamic stresses enter seriously into consideration, and that, although the strength of the metal might be increased without impairing its static ductility by means of alloys, the introduction of alloy nevertheless generally meant deterioration in so far as ability to resist dynamic stresses was concerned. It may be broadly stated as a general rule that the increase of alloy addition means a decrease in dynamic strength.

The speaker's investigation of vanadium steels began in 1901 and continued without intermission to the end of 1904; the first systematized figures were then communicated to the Institute of Mechanical Engineers (British). The work was done in a plant composed of three departments, viz., a special steel department; an hydraulic department and a boiler department, so that expansive trials could be made. After making plain crucible steels, the steel alloys and vanadium steels were worked upon, then vanadium steels were made in an open-hearth on a small scale and next on a large scale. It was found, in the course of the experiments, that vanadium not only imparted extra dynamic qualities to the steel, but that it had a static intensifying action on another alloy, such as chrome, nickel or several others. On account of this static intensifying property of vanadium it is possible to use a smaller portion of the other alloys, wherefore, taking into consideration

the dynamic attributes already conferred by vanadium the speaker had no hesitation whatever in saying that chrome vanadium steel is the finest material which has ever been discovered for mechanical moving machinery.

Vanadium is a most satisfactory alloy because it works so generally, and its work can be kept in the direction which is desired. If steels are compounded with reference to the particular work that they are to do, vanadium has put into the hands of the steel makers a weapon whose powers have never before been seen. There is no vanadium steel suitable for all purposes. All kinds and grades of vanadium steel are made for different parts of different machines. Machinery chrome vanadium steel will contain 0.25 per cent carbon, 0.45 per cent manganese, 0.9 per cent chromium and 0.18 per cent vanadium. Vanadium spring steel will contain nearly 0.50 per cent carbon with manganese from 0.8 per cent to 1 per cent, 1.25 per cent chromium and 0.20 per cent vanadium. Case-hardened vanadium steel contains 0.12 per cent to 0.15 per cent carbon, low manganese, 0.3 per cent chrome and 0.15 per cent vanadium.

In working the ingot vanadium steel must be reasonably treated in the first heating, a precautionary measure which applies to all steels of high temper. High carbon cannot be heated in the first stage in the same drastic fashion that a low carbon steel can be treated. The ideal conditions for heating any steel are found in a continuous billet furnace, where the heating is begun fairly cool and finishes hot; it is fatal to almost any steel to be placed cold into an intensely hot furnace, as has been demonstrated time and again though high temper steels are more susceptible to disintegration by heating than low temper steels.

It is almost impossible to give figures showing the actual increase of life in steel due to the addition of vanadium, but, in some vibration tests that were made with plain carbon steel under the conditions stated later under which 30-carbon forging steel of high quality ran 290, a lower carbon steel ran about 280; wrought iron ran 270; a sample of steel of the same carbon which ran 280, with the addition of vanadium showed about 450, while the effect of the simple addition of vanadium to a low carbon steel raises the tensile strength and elastic limit of that steel considerably, the increase is not so considerable as if it had another element to act through.

Two specimens of spring steel—a good crucible carbon spring steel and a piece of vanadium spring steel—were tested in the same alternating stress testing machine. The sample piece was ⅜ of an inch diameter, had a free length of 4 inches and was given a permanent deflection of ¼-inch a side. The carbon steel, annealed, under these conditions stood 250 vibrations; tempered, it stood 80; the vanadium steel, annealed stood 400 and tempered stood over 300. The speaker made some tests on structural steels for demonstration before foreign government officers, a sample being supplied by them of their best acid open-hearth steel used for axles and connecting rod bolts. That steel ran 290 alternations before fracture. An excellent quality of nickel steel fractured at about 270 alternations. A sample of vanadium steel, which in its static properties compared favorably with nickel steel, viz., annealed vanadium steel, broke at 570 alternations, or a ratio of over 2:1. A tempered vanadium steel possessing a static strength of just double that of the vanadium steel mentioned above and having practically the same ductility fractured at 480 alternations instead of 570. A piece of the best wrought iron be it noted on the same machine broke at about 270 alternations, or almost exactly the same as the nickel steel.

The rapidity with which the vibratory shocks are applied in this form of test has a great deal to do with the endurance figure obtained. A steel which will resist alternating stress almost indefinitely in service will break in the testing machine under stresses of such rapidity and magnitude as quoted in perhaps 45 seconds. The reason of this is that the material is given no time in which to readjust itself. It is rather unfortunate that there can be no accurate comparison between tests and the life of the steel in service, unless the conditions under which the test is made can be made the same as those which the steel meets in practical use, but work now being done may lead to some approximate factor being obtained. In the alternating impact test, the test piece is held vertically. When the "tool" of the testing machine moves forward, it strikes the specimen, deflects it and moves it beyond its elastic limit. Thus it is an alternate bending, partly by impact, giving the test piece "permanent sets" in opposite directions 500 times per minute. It should be noted that in this system of testing, the test piece should be polished to a glassy surface, as, if rough samples are used, widely discordant results are obtained, owing to the deep scratches acting as "notches."

It will be necessary to adopt standard conditions and standard size of test piece and a standard way of gripping the test piece. The same length of test piece must be used, and approximately the same rate of alternations within a few revolutions. The speaker understands that at the present time, Prof. Arnold is working out an elaborate series of tests to determine the different coefficients of time deflection, free length, etc. The results obtained with round specimens should not be compared exactly with results on square specimens, but the round specimen is easier to prepare.

In regard to the action of nickel towards increasing the life of steel, the speaker had not found any intensified nickel steel, whether intensified by vanadium or chrome, to have really a considerable measure of longer life when tested beyond its elastic limit and he strongly advocated the intensifying of chrome by vanadium when dynamic stresses were in question. If the requirements of the steel are more static than dynamic, or in equal proportion, vanadium nickel steel must be considered superior. The results, however, obtained in the automobile trade have been almost entirely due to the use of vanadium chrome steel.

Vanadium was formerly considered a rare element, but since the discovery by the American Vanadium Co., of large deposits of vanadium in South America, there is no likelihood of there being a shortage of this mineral. The cost of vanadium steel can be brought so low as to compete commercially with the alloy steels produced by the present modern commercial processes. Vanadium in steel is comparable to strychnine in medicine. It is a powerful medicine, and while a little is a splendid tonic, too much must not be used, or the ends desired are defeated.

Vanadium steels machine nicely, vanadium chrome steel acting almost exactly like carbon steel; there is practically no difference observable in machining a carbon steel axle and a vanadium-chrome steel axle, a point the value of which is very great.

There is no more difficulty in forging vanadium chrome steel than there is in forging ordinary nickel steel, while vanadium added to nickel steel does not make it more difficult to forge.

The presence of vanadium, as far as welding is concerned, is beneficial rather than the reverse, as it forms a fusible oxide and thus promotes the welding action of the iron. Taken in conjunction with chromium, it being a static intensifying element, much less

chromium can be used than heretofore; thus vanadium chrome steels are much more easily welded than ordinary chrome or nickel steels. The welding of vanadium chrome steel does not present any great difficulty. A bar of steel was taken containing about 0.25 to 0.30 carbon, cut in two, welded and twisted cold, so that it showed about two or three twists, while another piece welded and tested to destruction did not break at the weld. The welding was done in an ordinary blacksmith's shop at about the same heat that would be used to weld a 0.20 per cent carbon steel. While the writer does not recommend this particular type of steel as a welding steel pure mild steel containing vanadium is as good a welding material as the best wrought iron that can be obtained.

The speaker is by no means advocating abandoning the tensile tests or their reliance to give some necessary indications of the quality of steel, but, in many instances, a steel may possess all the tensile strength needed, and perhaps a little more, and, in order to supposedly perform certain services, this tensile strength is increased which is not desired at the expense of some other qualities which are desired. The dynamic qualities of the material must be kept up, in order to secure success with the steel. If the dynamic qualities can be improved, it is in some cases possible to adopt a material of a lower tensile strength of the same ductility and to succeed where the material with a higher tensile strength had failed. For instance, a special quality of open-hearth vanadium steel, tempered in ordinary works, has an elastic limit of 224,000 pounds with an ultimate strength of 232,000 pounds, an elongation of 11 per cent and a reduction of area of 39 per cent. This steel would be recommended for certain purposes, but not for a chain shaft or driving axle of an automobile, because it does not possess the same dynamic qualities that may be obtained in steel having a lower tensile strength, yet amply sufficient for all requirements.

Mr. Souther has made in his laboratory at Hartford, Conn., some endurance tests, which bear out the remarks of the speaker concerning strain and elastic limit. A piece of vanadium steel tested in a rotary machine has run 100,000,000 revolutions without breaking under the fiber stress adopted for the test. In the opinion of both Mr. Souther and the speaker a modification of the test should be made, which is to take the fiber stress which has been adopted as the standard, 53,000 pounds to the square inch, and run a specimen 10,000 revolutions. If it does not break, the fiber stress should be increased ten per cent and run 10,000 revolutions more, and so on, increasing the fiber stress ten per cent every 10,000 revolutions, as in a wheel of high elastic limit. The ordinary fiber stress will not show a true comparative value, a variable factor being introduced. When steel is tested beyond the elastic limit, the fundamental quality of the metal to resist disintegration of the molecules is determined. The importance of this point is by now fully recognized, and here vanadium steels are so pre-eminent as to almost stand alone.

NEW LIFT BRIDGE OVER THE BUFFALO RIVER

Buffalo, July 6.—A lift span bridge, one of the largest ever built, is nearing completion here. With the exception of a few minor details and reinforcements, made necessary by the increased weight of cars which will pass over it, the bridge construction is complete. It is known as the Ohio street bridge and serves as an outlet from the city into the roadway known as the Hamburg turnpike. The bridge spans the Buffalo river and the traffic of large vessels made the bridge a necessity. It will greatly facilitate navigation in the Buffalo river, the small and old-fashioned features of the former bridge having caused much trouble for commercial interests and being responsible for a number of serious accidents besides obstructing the passage of vessels of the larger class.

It is nearly three years since the first work was done which led to the building of this structure. The old swing bridge, which stood where the new lift span bridge now stands, was moved to a temporary location. Then it was necessary to deepen the channel. This was a difficult task inasmuch as the river bed at this point is practically of solid rock. It was accomplished, however, and the channel

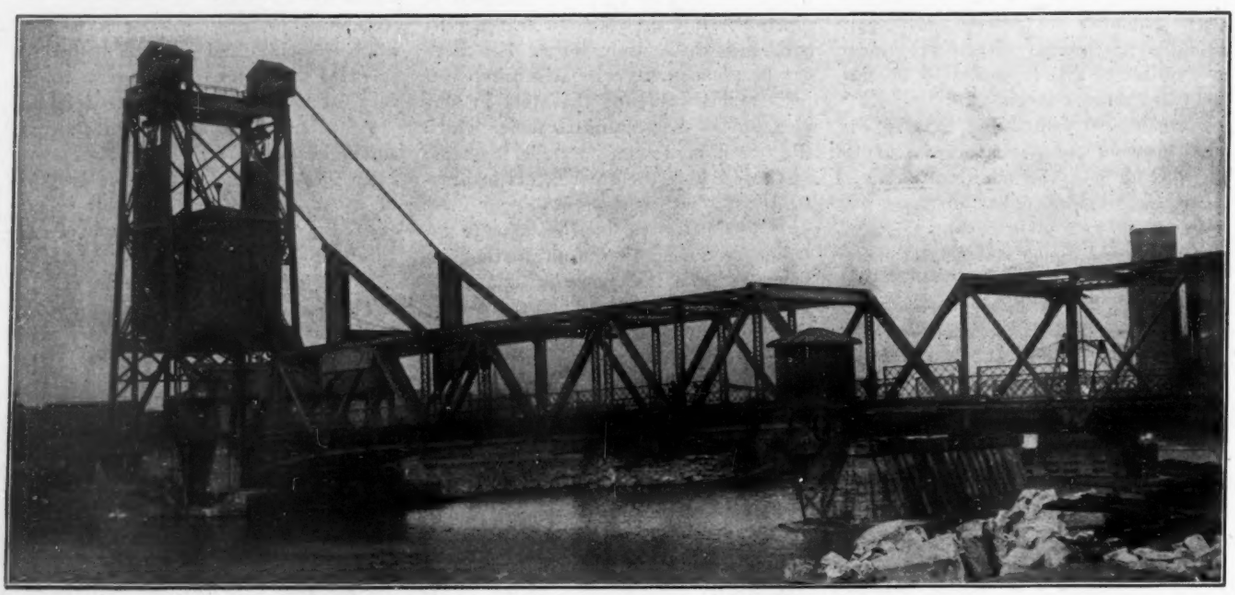


FIG. 1.—OHIO STREET LIFT BRIDGE OVER BUFFALO RIVER, BUFFALO, LIFT SPAN LOWERED.

was deepened from 19 to 23 feet. As this work was done under a general contract for deepening various portions of the channel, the progress made was not as rapid as it might have been and for this reason there was a good deal of delay in setting the first pier at the end of the north approach. But with the exception of strikes the work progressed well until the end. The first metal for the bridge was placed April 13, 1906, but the foundation was begun in June of the previous year.

Original plans called for a bridge which would support at least four 40-ton electric cars, but the changes in traffic methods have made it advisable to operate 50-ton cars over the bridge. Engineers made a careful study of the bridge and decided that it could be strengthened sufficiently to support the heavier cars, and, as soon as material is out of the shop, the track stringers will be reinforced, additions made to the counterweight, and a few minor changes. The lift span was lowered for the first time, May 18, 1907.

Total cost of foundations and superstructure was $176,960, the superstructure costing $117,700, and the foundations $59,260. The Pittsburg Steel Construction Co., had the contract for superstructure and the foundation contract was let to Bardol & Roberts, of Buffalo, but practically all of the foundation work was sub-let to the Buffalo Dredging Co. Capt. G. H. Norton, of the City Engineer's office, had charge of the erection. Concrete was used for all of the foundation work. The height of the cable sheaves is 103 feet 6 inches above water, riding a 28-foot roadway. The moving span has plank floor, differing from the approach span which has a flooring of concrete and sidewalks of the same material. Brick was used in laying out the roadway of the approach. The truss height is 21 feet; width of bridge, 44 feet. There is a 1 per cent grade on the lift span, while the approach span has a 2 per cent grade down from center pier to abutment.

Of the superstructure the tower was built first and then the moving span, which was built in a vertical position. The stationary approach was the last task undertaken in the erection of the superstructure. Including the tower, the bridge has three spans, the length of the lift span being 166 feet, and the stationary approach span 100 feet 6 inches. The length of the tower span is 52 feet.

The lift span is operated by hydraulic pressure. The tank which was constructed in the tower is divided into four sections. Two are high pressure and two are low pressure. The low pressure tanks are 50 inches diameter and 16 feet high. The high pressure tanks have a diameter of 30 inches and are 12 feet high. The low pressure tanks withstand 150 pounds pressure to the square inch, the others 300 pounds. The high pressure tanks are used in emergency

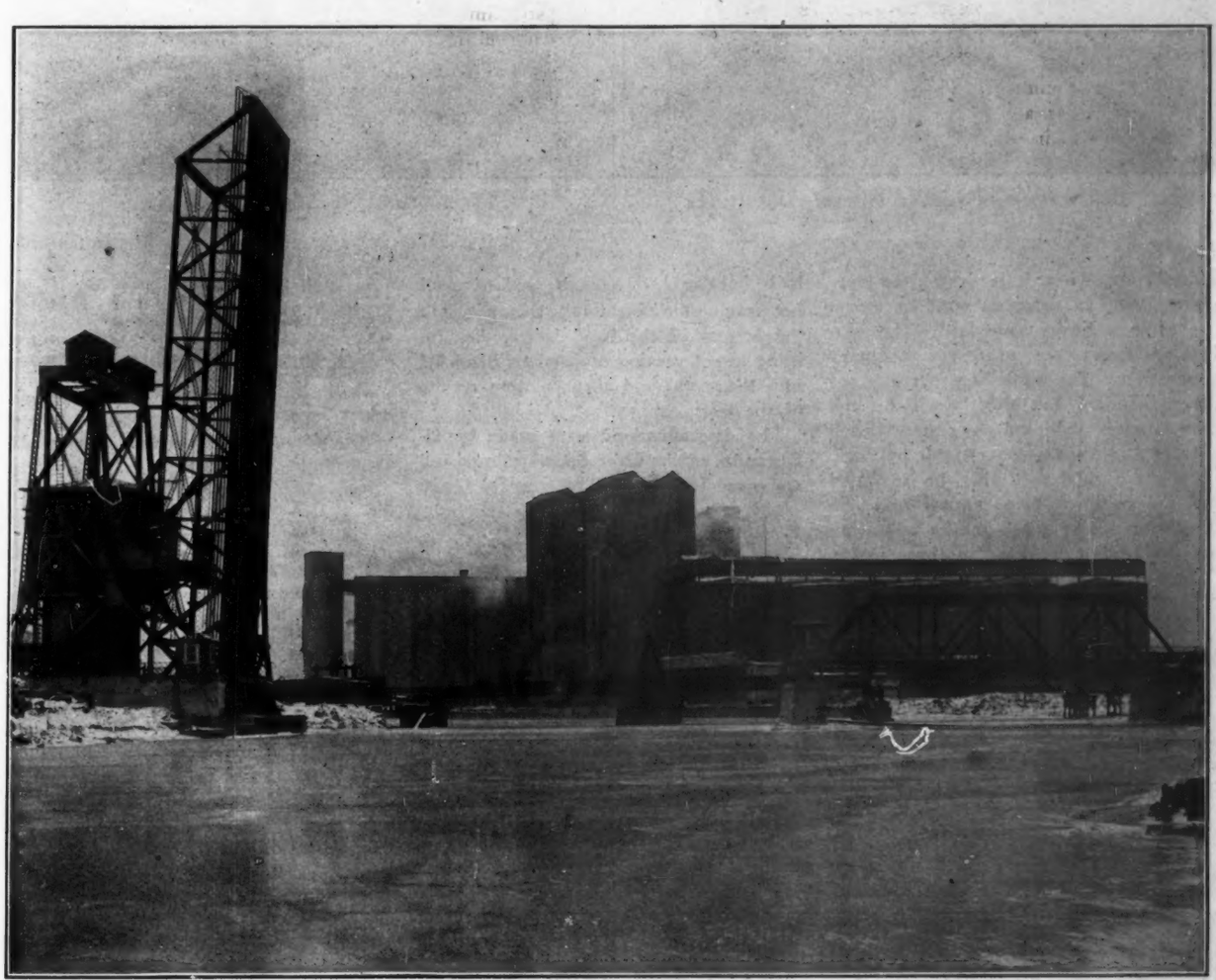


FIG. 2.—OHIO STREET LIFT BRIDGE OVER BUFFALO RIVER, BUFFALO, LIFT SPAN RAISED.

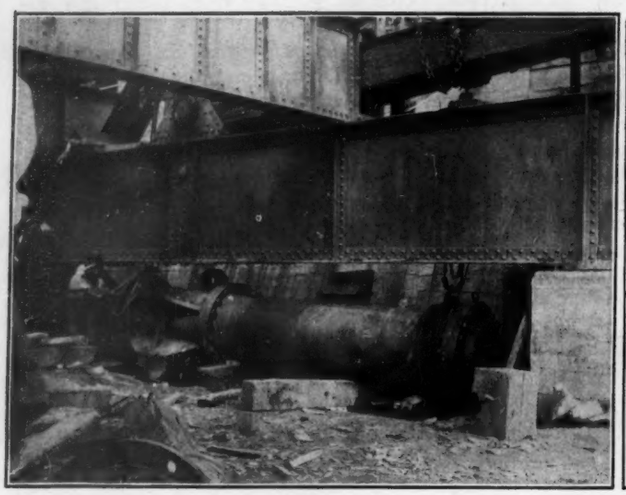


FIG. 3.—OPERATING CYLINDER GIRDERS AND UNDER TOWER SPAN.

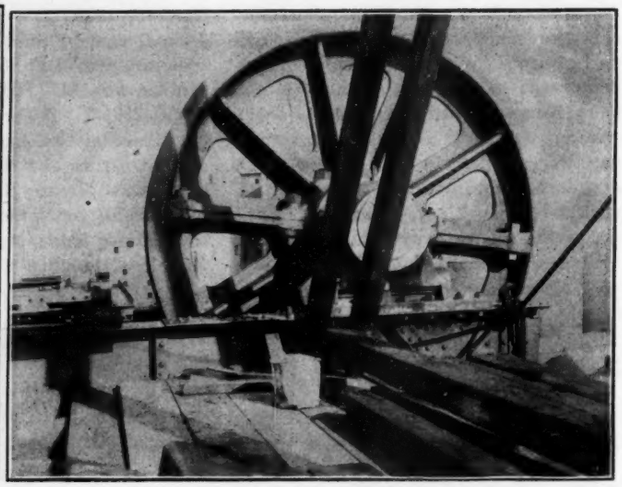


FIG. 4.—CABLE SHEAVE ON TOP OF TOWER.

cases only, when it is desired to operate slowly in times of wind or storm or after a heavy snowfall. The 150-pound tanks are used for ordinary operation. The signal system has not been installed, but shortly will be and the signals adopted by the United States Lighthouse Board will be used. Electric lights will also be installed on the bridge. Two tenders and one engineer are required in the operation of the bridge, working in three shifts. The Osborn Engineering Co., of Cleveland, designed the bridge and Thomas E. Brown, of New York, supplied the machinery.

NICKEL IN CAST IRON.[1]

BY JAS. F. WEBB.

In reporting on the tests authorized by this association last year, I beg to submit the following results: I made twenty test bars, ten with the nickel added and ten without, all from the same ladle holding 1,400 pounds, and of good hot iron. Nickel thermit was put into the bottom of the hand ladles, the aim being to get varying proportions of nickel into the metal and then to note results of the tests.

The determinations were made by H. E. Smith, of the Lake Shore railroad and are presented herewith:

Table I.
Physical Tests.
Cast Iron Test Pieces from Elkhart, Ind.

Mark.	Diameter, inches.	Cross Breaking weight.	Deflection.	Modulus of rupture.
1 N	1.25	3,000	0.11	46,870
1 N	1.24	2,970	0.09	47,520
2 N	1.24	2,510	0.08	40,160
2 N	1.26	2,820	0.10	43,010
3 N	1.26	3,000	0.10	45,760
3 N	1.25	2,690	0.09	42,020
4 N	1.26	3,130	0.09	47,710
4 N	1.23	3,010	0.09	49,330
5 N	1.25	2,370	0.08	37,030
5 N	1.23	2,570	0.09	42,130
1 X	1.26	2,990	0.08	45,600
1 X	1.26	2,790	0.09	42,550
2 X	1.26	2,740	0.10	41,790
2 X	1.25	2,890	0.10	45,140
3 X	1.26	2,750	0.08	41,950
3 X	1.23	2,690	0.10	44,100
4 X	1.25	2,610	0.09	40,780
4 X	1.23	2,770	0.10	45,410
5 X	1.25	2,470	0.09	38,600
5 X	1.25	2,760	0.09	43,130

Tests on 1¼-inch round bars, supports 12 inches apart.

Table II.
Chemical Analysis.

Mark.	Manganese.	Phosphorus.	Sulphur.	Silicon.	Nickel.
1 N	0.460	0.63	0.090	2.07	0.67
2 N	0.455	0.63	0.089	2.08	1.18
3 N	0.450	0.63	0.091	2.05	2.07
4 N	0.444	0.62	0.087	2.02	3.25
5 N	0.444	0.63	0.088	2.10	6.65
3 X	0.450	0.62	0.086	2.12	——

The results would not indicate a marked improvement in the physical strength of the castings, and would bear out the supposition that nickel in cast iron is either not distributed uniformly enough to do much good, or else will find its best use in special classes of the metal freer from the high percentages of impurities incident to the ordinary casting.

It is to be hoped that further experiments can be made to prove just what does happen when nickel is added to cast iron, and I take pleasure in giving the above results as a contribution to the literature of cast iron when nickel is added to the ordinary grade.

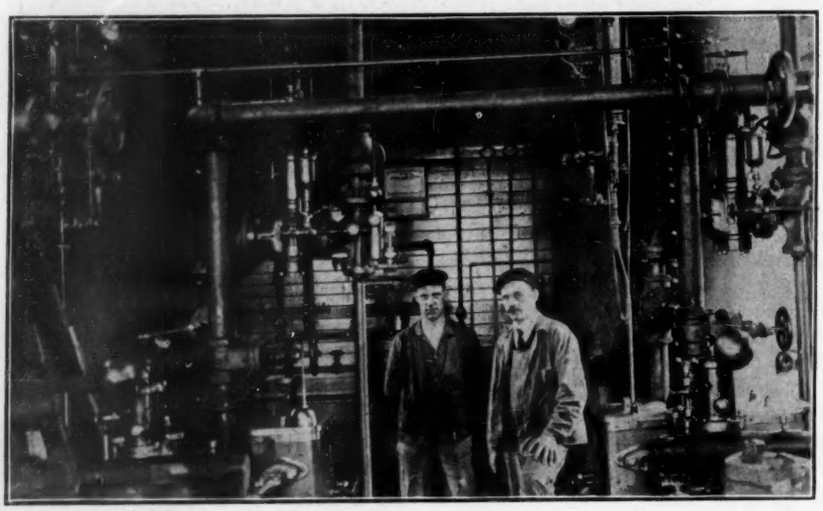


FIG. 5.—OPERATING ROOM.

The Stewart Iron Works Co., Cincinnati, has issued No. 1, Vol. 1, of a series of bulletins to be issued monthly by it, describing iron fences and general, plain, and ornamental iron and wire work which it manufactures.

[1] A paper presented at the Philadelphia (June, 1907) meeting of the American Foundrymen's Association.

THE RELATION OF ENGINEERING SCHOOLS TO POLYTECHNIC EDUCATION.[1]

By Dugald C. Jackson.[2]

The impulses which caused the settlers of New England to found schools and colleges simultaneously with clearing the land for their dwellings seem to have universally affected the pioneers of this country, and the establishment of schools has played a notable part in their policy. The hardy frontiersman has seldom blazed a trail which schools have not promptly followed.

This regard for school education is not singular with the American people but it has been singularly universal with them, and a comprehensive educational system has resulted which reaches even to the remote byways of the country. An educational system which meets the needs of the country, however, must be something more than a mere comprehensive school system in touch with the people. It must not only offer education in general, but it must also offer those special educations which are necessary for the fullest development of each branch of human endeavor and service. In satisfaction of this condition, the great variety of professional schools have been established,—divinity schools, law schools, medical schools, schools for the professional engineer,—and on the other hand, trades schools of various characters. In the latter respect, however, this nation has been at fault. Some trades schools have been established and maintained, and manual training has come to be highly regarded,—perhaps here and there too highly regarded in the high schools though insufficiently established in the grade schools; but the development of trade schools has been insufficient to the country's need, and foremen's schools are still almost unknown.

A wise enactment looking towards the establishment of these schools throughout the nation was passed by the National Congress during the period of the Civil War, whereby each state of the United States was allotted an acreage from the national public lands in proportion to its national representation, the proceeds to be applied more particularly to instruction in agriculture and the mechanic arts, without excluding other subjects of study. This wise enactment, born in the midst of civil strife, has been the foundation of many of the great state universities which make a notable feature of various of our western states. The United States congress of recent years has added continuing appropriations of money for the same purposes, but more particularly with the design of supporting agricultural research.

These appropriations have been used with wisdom and with great advantage to the nation and its people; but, as far as mechanic arts are concerned, the term has been construed liberally and the work of the colleges using these appropriations has been largely in the grade of professional engineering work, or trending in that direction. The demand for university-trained engineers has been marvelous and the "land grant" appropriations have been insufficient to support more than one educational effort in this line, and in many states they have been insufficient to support even one fully, so that it has been excusable in the past for the state colleges and universities to limit their activities. The diversion of fine private bequests from their apparently intended use for the foundation of trades and foremen's schools, to a support of attempted professional engineering schools alongside of engineering schools already in existence, seems to me not so excusable.

The lead of the agricultural schools arises partially from a lack of farsighted altruism amongst the agricultural people, who clamor for the expenditure of public funds to advance agricultural education in all its branches, and especially those branches that come close home to the individual farmers and dairymen. but are selfishly unwilling to see public funds expended in those lines which appear to immediately aid the manufacturers, who, allege the farmers, are able to help themselves. This line of argument springs from the idea that the prosperity of the country rests upon its agricultural resources: and any one who has lived, as I have, for years amongst the people of the fertile plains of the central west and northwest cannot help but be convinced that this line of argument contains much of truth. However, it is false in its premises, because it fails to remember the unassailable fact that the prosperity of the agricultural interests and the concurrent contentment of the agricultural population are dependent in this country to an extended degree on the intelligence and prosperity of the industrial population. The interests of each—the agricultural and industrial populations of this country—are so bound up together, that only by friendly co-operation in most things, including the educational interests, can the highest welfare of either be conserved. It seems to me that it is of almost as much interest to the mechanic or mill foreman that the farmer shall be taught how best to perform his labor to bring forth the largest and best matured crops as it is to the farmer himself. And conversely, it seems to me that it is almost equally to the interest of the farmer and of the industrial foreman that the latter shall be afforded the best available training for the practice of his vocation.

Now, let us turn to consider the relative importance of proper education.

"Upon the subject of education, not presuming to dictate any plan or system respecting it, I can only say that I view it as the most important subject which we as a people can be engaged in."

What Abraham Lincoln thus said in 1832 is even more applicable to the conditions of our times. Only the education to be found in the elementary common schools was probably then in the mind of the speaker, and the extended school educations of a vocational nature, and especially of a professional nature, were apparently not within the purview of his experience; but these were not outside of his horizon, for he would have an extension of that education which leads to morality, sobriety, enterprise and industry, as is shown by another sentence from the same address:

"For my part, I desire to see the time when education—and by its means morality, sobriety, enterprise and industry — shall become much more general than at present, and should be gratified to have it in my power to contribute something to the advancement of any measure which might have a tendency to accelerate that happy period."

The happy period referred to in this quotation has manifestly made its appearance, but it is right to give sober thought as to the effectiveness of its coming and whether much is not yet to be done to accelerate the period. It is particularly appropriate for us, of this society, to take this sober thought and give consideration to this matter on account of the close relations that engineering instruction ought to bear to the industrial affairs of the nation.

It is a question to be seriously considered whether the faculties of the engineering schools have yet duly recognized the responsibilities for the

[1]Presidential address delivered at the Cleveland (July, 1907) meeting of the Society for the Promotion of Engineering Education.
[2]Massachusetts Institute of Technology.

extension of the education through which comes "morality, sobriety, enterprise and industry," which rest on them because of their relations to industrial affairs.

The engineering schools, like their friendly rivals, the agricultural schools, have before them a field which may be divided into three parts—a triple field—two parts being semi-professional or completely professional and the third vocational and subordinate to the others. The engineering schools have only occupied one effectively, though a few are now growing towards an occupation of the second.

These three parts to which I refer are the divisions of the educational scheme of the nation in which fall: (a) Engineering research and the advanced professional instruction which is being given here and there to a few graduate students; (b) The engineering courses of study as they are now ordinarily planned; and (c) The instruction of artisans and especially instruction adequate to the needs of industrial foremen or sub-superintendents, that is, master craftsmen.

The second of these educational divisions in the order here named, it seems to me the engineering schools are occupying very well, but even here there is a lack of effectiveness which seems due to lack of correlation between the schools and lack of study of pedagogic history by those persons responsible for the direction of the schools. Reasonable independence and individuality in methods of teaching is due to the individual men who are experienced and worthy in each school, and the individuality of the several schools must not and cannot be infringed; but unhappily in the past, there have been contrasts of pedagogic views and professional ideals that cannot be justified, for in these things (matters of judgment though they be) truth can lie only in one direction, however diverse may be the paths over which she may be approached.

It is to the third educational subdivision that comes distinctly within the purview of the influence and direction of the engineering schools though preferably not within the scope of their curriculums that I direct your attention. This is the instruction for artisans, and particularly the instruction intended for foremen and sub-superintendents.

The reports of the eleventh census give some illuminating figures in regard to the number of skilled workmen and the number of foremen in industrial pursuits. These figures must be admitted to be lacking in precision on account of the difficulty of drawing an exact line of demarcation between skilled and other workmen and the difficulty of phrasing an exact definition of the services that make a man of the rank of foreman, but the figures indicate the magnitude of this problem in education, and they are sufficiently accurate for the purpose.

As a farther indication pointing in the same direction, but belonging distinctly in secondary instead of higher education, I will call your attention to the fact that the first Industrial Commission of Massachusetts pointed out in its report of 1906 that there are no less than 25,000 boys and girls between 14 and 16 years of age in the state of Massachusetts who are now in various kinds of juvenile employments or are idle, and all of them without any adequate trade education. The secondary industrial schools of the country are utterly without adequacy in numbers or extent to meet this problem in secondary education; and the schools suitably planned for the appropriate education and improvement of foremen are almost unknown with us.

I lay this latter fact at the door of the engineering schools, and hold that the members of the faculties are not guiltless unless they make adequate efforts to get filled this need in education for master craftsmanship in the industries, which comes within the purview of their influence and direction.

The governing boards of the engineering schools must divide the guilt with the faculties, if they continue their common failure to provide sufficient teaching force in the engineering departments, thus putting any effort which reaches beyond the routine of the department curriculum and touches the larger interests of the industrial body beyond the physical endurance of the individual members of the faculties.

Governing bodies have also been at fault heretofore by too close adherence to a standard for engineering teachers in which mere ability to impart information in the class room, without consideration of any breadth of ambition, has held too predominant a place in the selection of men, and breadth of view in industrial affairs accompanied by clearness of judgment has had too small a place. I do not undervalue the technical ability to impart information in the class room, and assent that this should be properly given much weight in selecting men for the engineering faculties; but this ability, however largely developed and however fully accompanied by engineering skill is far from sufficient to make an adequate member of an engineering faculty.

The acts of many governing bodies heretofore are in some degree excusable in consideration of the breathless growth of engineering schools which has seemed to make impracticable any pause for thought or consideration of needs beyond those of the day's pressing want of active teachers and suitable appliances to give strength to their teaching. It seems to me less excusable that so large a proportion of the leading men in the engineering schools should neglect on their own part a due consideration and study of pedagogic history and the development of the lines of philosophy and sound pedagogic thought, which lead inevitably to broader sympathies and more comprehensive professional views. An engineer who has cultivated a correct professional spirit ought to promptly recognize and fully appreciate the importance of careful study of professional precedents of the best types, and if the engineer is also a teacher, he seems to be under obligation to take a comprehensive view of both sides of his vocation, the side of engineering and the side of education.

I believe that such views lead emphatically to the proposition that engineering schools are called upon to extend their influence so that they will continue their present work of education for the scientific engineer; advance the work of engineering research and advanced professional study; and also foster the establishment, maintenance and development of polytechnic schools for master craftsmen.

As instances of a start in the direction of such polytechnic schools fostered by the faculties of engineering schools, I will point to the Summer School for Artisans at the University of Wisconsin, and the Lowell Institute School for Industrial Foremen at the Massachusetts Institute of Technology. Certain courses of the Pratt Institute are instances of work successfully done in the direction in an independent school, but even there the work is directed by men who have had experience in the faculties of engineering schools. Such schools supported by endowments or by the state could wisely be founded in each large industrial center, but in each instance the school government needs the combined interest, activity and support of the better manufacturers and of suitable members of the faculty of a great engineering school. It must always be borne in mind that these schools should equally assist the craftsmen

and the industries employing them, and thereby improve the fitness and promote the prosperity of the state.

In the first part of this address I have pointed out that the contrast between the hitherto development of farm and dairy education and industrial foremen's education is partially due to a certain trade selfishness of the farmers; but there are also two other active causes which are particularly strong in the eastern states. One of these is a hesitation on the part of associations of industrial workmen to give countenance to education which cultivates and strengthens the special aptitudes of each man and thus tends to accentuate and enlarge the differences between the abilities, usefulness and earning powers of individuals. This jealousy of education, notable on the part of some, is an unhappy phase of the development of civilization, but right-minded men soon find that appropriate and thorough education for one's particular work not only adds to earning power and ease and satisfaction for the individual but it also reduces jealousies and tends toward a brotherhood which improves the condition of all workers. We are compelled by the inexorable facts of life to see that men are of different abilities, and nothing is gained by any attempt to deny or evade the truth. The best that we can do is to place each individual man, as far as may be, in the situation that he is best adapted to fill by ability and education. Then the advancement of any individual is a cause for the congratulation of all, for it makes new opportunities all along the line, for each individual to profit by in proportion to his demonstrated abilities, education and experience, and his readiness to work in co-operative relations with his fellows. For these and many other reasons which show that education is useful to all the men who are willing to profit by it, the organizations and associations of workmen should not oppose but should favor the purposes of trades schools and foremen's schools. Happily, the more influential of such organizations are coming more and more to lend their favor to such schools.

This brings me to the second of the above-mentioned contributing causes to the contrast between the condition of development of the agricultural and the industrial schools. Relatively few men have come to large fortunes through agricultural pursuits, but those whose fortunes have been so founded have ordinarily discharged their obligation by extending their personal favor and aid to agricultural education, and through endowments given for the same cause. Indeed, large numbers of men who have only won a fair competency through agricultural pursuits have given liberally of their time and even of money for the encouragement and support of agricultural education, and have seen to it that the expenditures have been made in the manner most useful to the people.

I am sorry to say that the men who have made fortunes through the manufacturing industries and transportation have seemingly not proportionally supported industrial education. Some large endowments and bequests have been worthily bestowed where the income is used in engineering education, and a few endowments are directed toward the support of trades schools, but all that has thus far been done is wholly inadequate and disproportionately small in comparison with the annual returns coming each year from the manufacturing and transportation industries.

The men who have come to wealth through the association with these industries seem to prefer to found great art galleries or museums rather than industrial schools. Galleries and museums have been proclaimed more widely, and their needs may have thus been brought more directly to the attention of those who have come to fortune through the industries and have money to bestow. In respect to that, while asserting that I will not take second place to any one in appreciation of the fine influence of art galleries and museums, I also insist that at the present juncture of education in this nation any man with a fortune to bestow can do a more pervading good by aiding the engineering schools to develop the work of engineering research, and by establishing schools for industrial foremen to be directed with the assistance and advice of the engineering schools.

Our communities maintain manual training schools and here and there a trades school, and great professional engineering schools are maintained in the east by private endowments and in the great states of the west by appropriations from the state governments; but there still remains a gap in industrial education which lies between the elementary trades schools and the professional engineering schools of university grade. This gap must be filled and it will be filled promptly if the men who are and who ought to be members of this society do their duty. It is imperative to give to the thousands of young men who are to make the bulk of the corporals and sergeants of industry that education which makes for self-support in the best sense, makes for proper parentage, and makes for a good grade of thoughtful citizenship (to which foremen's schools may be directed in keen fashion) before the education which lends figure and charm to a man's recreations (such as so fortunately comes from the art galleries and museums) is taken up. I believe that no use of money can bring greater returns to the state, or greater satisfaction to the giver who understands the educational situation, than large gifts for the purposes of industrial education that I name.

Tests Apprentice Pact.—In a suit brought in the local courts of Pittsburg to test the rights of employers and apprentices, the Thomas Carlin's Sons Co., Allegheny, Pa., manufacturer and machinist, has asked damages from the fathers of six of the apprentice boys employed by the company. It is declared that the parents of the boys apprenticed them to work for the company for a period of 10,800 hours at a graduated scale of wages, but that on June 6 the youths went on a strike and now refuse to return to work, thereby violating the agreement. Damages in the sum of $2,500 from each parent are asked for.

FOREIGN TRADE OPPORTUNITIES.

(These inquiries from prospective foreign purchasers are furnished by American consuls to the Government Bureau of Manufactures, Department of Commerce and Labor. Those in which the addresses are omitted are on file at the Bureau of Manufactures, Washington, D. C. In applying for addresses refer to the file number.)

No. 1181. Machinery, steel casks, turbines, typewriters and portable sawmills.—An American consular officer in South America writes that a merchant in that section desires correspondence and catalogs from a house making machinery for the manufacture of cellulose from sugar-cane waste; from manufacturers of steel casks (toneis) for alcohol; from manufacturers of turbines for water power; from manufacturers of cheap typewriters, and from manufacturers of portable sawmills.

No. 1166. Locomotives and railway supplies.—John B. Jackson, minister to Greece and diplomatic agent to Bulgaria, writes as follows from Athens: Some time ago the Bulgarian government invited bids for the furnishing of a number of passenger and freight locomotives for the State railways. I did not report this fact at the time, because there would not have been sufficient time for an American firm to compete unless it had already studied the question and was familiar with Bulgarian wants. Now, however, it has been announced that all the bids have been rejected, as the government found them all too high, and that private negotiations are to be carried on with certain Austrian and German firms with a view of obtaining the desired locomotives on satisfactory terms. If matters can not be arranged, the government intends postponing the purchase of these locomotives indefinitely. Under the circumstances the attention of American manufacturers is invited to this matter.

STRIKING CONTRAST

In Conditions in Finished Lines in England Compared with Last Year.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., June 26.

Iron trade interest still centers upon pig-iron, the high price and scarcity of which are a source of serious trouble to iron manufacturers. But, generally speaking, the finished iron trade shows a remarkable contrast to that of a year ago when prices were decidedly weak. At present, the mills are running regularly, and though there are no big contracts, the supply of orders is sufficient to fully replace those executed. The end of the June quarter is almost invariably quiet, but this year is altogether an exception. The steadiness of Midland prices tends to promote confidence, and orders are being placed as they are wanted. There has been a marked improvement in the galvanized sheet trade, in which it is quite easy to get the full price of £13 17s 6d. It is now clear that the dullness of a month ago was due to a deliberate attempt to force down prices by keeping back orders. Dear materials foredoomed the effort to failure, and orders are coming from all parts of the world as plentifully as they have at any time during the past two years. The east in particular is a good customer. The trade has benefited slightly by a little giving way in the price of spelter.

Rail Mills Active.

The steel department continues very strong, the basic establishments having six months' work ahead. The rail mills have been doing very well for some time, with large inquiries still coming in from the east, while in the tin-plate trade orders are being placed for months ahead.

There were many rumors on 'Change last week of impending imports of German steel in the form of bars and billets. But the merchants who have had most to do with such imports in the past professed ignorance on the point, and it is significant that some German representatives have not put in an appearance here for months past. A cargo of steel has also been sent here from Russia, though it is said the sample quantity which found its way to the Midlands was unsatisfactory. As prices fully maintain their firmness, it is evident these rumors are not very seriously taken. Generally speaking, finished iron prices are really firmer in the Midland district than they were a month ago. Wire works are busy, and the makers of tubes for naval purposes are working night and day. There is a big demand for enamelled plates for advertising purposes, and the local builders of wagons and carriages are still full of work.

The Rhymney Iron Co. has just issued its report showing an increase of profit from £41,495 to £59,192. The dividend is increased from 2 per cent to 3 per cent and £4,000 is appropriated to debenture redemption.

Death of Charles Akrill.

Very general regret is expressed at the death of Alderman Charles Akrill, one of the largest ironfounders in the district, who so long since as 1878 purchased the Goldsgreen Iron Foundry at West Bromwich, and had a reputation in this country and on the continent for the production of first-class chilled and grain rolls.

The annual report of the Wolverhampton Chamber of Commerce just issued includes some important references to the iron trade. The galvanized iron manufacturers, the council states, look back upon a satisfactory year's work. Higher prices had been obtained than had been known for a decade past, and advances were strongly upheld by the increased cost of steel. The wrought iron tube trade has been well employed, principally for foreign markets, the home trade especially during the latter part of the year having been restricted.

Fund for Conciliation.

The excellent work done by the late Sir David Dale, Bart., to the north of England in connection with conciliation is to be permanently commemorated, a movement having been commenced for the provision of a memorial. Towards this fund, Pease & Partners, Ltd., have already contributed the handsome sum of £500.

Interesting developments are reported in connection with important northern works. C. J. Bagley has resigned the managing-directorship of the Cargo Fleet Iron Co., Ltd., but will remain on the board as a director. He has been succeeded in the managership by Benjamin Talbot. Mr. Bagley still continues to act as managing-director of the South Durham Steel & Iron Co., Ltd.

Reports from the northern steel rail companies are still of the most cheerful description. Substantial orders are in course of execution and more are being received. The Mossbay Iron & Steel Co., last week despatched 4,000 tons of rails to Alexandria.

Cammell, Laird & Co. have just completed a new plant at Sheffield for the manufacture of projectiles of all descriptions. It is understood that the firm has now practically decided upon a site at Swansea for the new works it is proposing to erect on the Welsh sea-board.

Blast Furnaces Started.

Local ironmasters are much interested in a report received in Birmingham from Sydney of the recent opening of the blast furnaces at Lithgow on the Blue mountains, at which pig-iron has just been produced for the first time from native ore. Although iron developments have been talked of for the past 50 years, hardly anything had been done until about 18 months ago. But extensive galvanizing works have now been established in New South Wales and it is understood that the government will be a large customer. The new works are to produce bars, plates, sheets and nuts. The matter is of some interest to this country as Australasia is one of our best customers, its imports of tinplates and sheets amounting to 200,000 tons per annum. This would require at least 140 rolling mills to produce. At present, there is only one mill in the colony. But the colonists speak with great confidence of eventually meeting all their own requirements. It is known that the colony contains immense supplies of coal, coke, iron ore and lime, and at Lithgow all these are very abundant. The new supplies come from Carcoar, a short distance away, where there are 13 outcrops.

COAL MINERS RESUME.

Birmingham, Ala., July 8.—The commercial coal operators of Alabama have signed the wage scale of the United Mine Workers of America and there was a general resumption of work this week at all the mines which were affected. The past week was spent in making necessary repairs, changing boilers or adding new boilers, working on tipples and doing other work that cannot be done while the mines are in operation. A. J. Reilly, secretary of the commercial coal operators' association, requested the meeting with the officials of the United Mine Workers in this district and the old contract was renewed, the demand for concessions, such as monthly instead of semi-monthly pay days and a laborer with every miner being withdrawn. There is a demand for every ton of coal that can be mined and the production right now is larger than it ever was before. Mr. Reilly estimates that the production in Alabama during the present year will go to 15,000,000 tons. It approached the 13,000,000 mark last year.

REPAIR WORK

Extensively Done on Pacific Coast—Scotch Iron Used—Industrial Notes.

(Special Correspondence.)

Seattle, July 7.—A great deal of the work done by Pacific coast firms consists of repair jobs charged for at an hourly rate. Posted conspicuously in the offices of a number of companies is seen a printed card bearing the following scale of prices, a comparison of which with eastern rates may be interesting: "Minimum Charges per Hour.—75 cents for all general floor, bench, or small tool work involving the use of ordinary shop equipment; 85 cents for all work requiring the use of any special tools or regular tools of 24 and 36-inch capacity. Gear cutters, milling machines, turret lathes, and other tools not common to ordinary shop equipment will be charged at this rate; $1.00 for all large tools having a capacity of 36 inches or over; 85 cents for all pattern work; $1.50 for general blacksmithing including one helper and forge fire. Charges for heavy and special blacksmithing at the option of the shop."

Scotch iron is being extensively used by Pacific coast foundries. The price is considerably cheaper, the delivery quite as rapid and the transportation troubles much less vexatious than with native material. Glengarnock No. 1 pig is delivered on board cars on the wharves of Seattle or Tacoma for $30 per ton. Corresponding Pittsburg iron costs $41 delivered, of which about $15 represents freight charges.

The Pacific Iron Works, Seattle, have recently received a large order for cast iron water pipes, elbows, tees and crosses. The sizes vary from six to 24 inches.

Thus far the season's shipments of iron and machinery products to Alaska is 4,000 tons, 1,000 tons being steel rails. Owing to the construction of new rails and to the large amount of development work in progress, the Alaska machinery and metal trade is very brisk at present and is now limited only by the capacity of the ships available for carrying the freight. A great deal of this freight goes to Catalla at the mouth of the Copper River, where the Copper River & Northwest Railway is under construction. A notable shipment of this week went on the schooner Raineer, which carried four locomotives and 1,300 tons of railway material, shop supplies, and machine tools.

Work on the new steel plant now under construction at Irondale, Wash., is progressing rapidly. James A. Moore, head of the company back of the development, recently announced the purchase of the three-masted bark Melanope, to be used in bringing ore from the mines in British Columbia to Irondale.

RIVAL FACTIONS

Struggle for Control of Dominion Iron & Steel Co.—Canadian News.

(Special Correspondence.)

Toronto, July 7.—A great stir has been occasioned in financial circles by the struggle between opposing interests in connection with the Dominion Iron & Steel Co., the annual meeting of which was to have been held in Montreal on July 5. It has been known for some time that an influential party among the stockholders, headed by James Ross of the Dominion Coal Co., has been endeavoring to secure a controlling interest by buying up stock in order to compromise the difficulty between the steel company and the Dominion Coal Co. on a basis favorable to the latter. President J. H. Plummer and the present management are opposed to this move and had issued a notice indefinitely postponing the annual meeting in order "to prevent any possible embarrassment of the company's position in its dispute and pending litigation with the Dominion Coal Co." The object of this was to gain time in order to reach a large number of the shareholders at a distance. Three of the directors, E. R. Wood, of Toronto; S. F. Pearson, of New York; and W. B. Ross, of Halifax, have resigned. George Caverhill and W. G. Ross, of Montreal, have been chosen to fill two of the vacancies.

The Dominion Iron & Steel Co.'s ore loading pier with its superstructure and a quantity of trestle work at Wabana, Newfoundland, was destroyed by fire July 5. It is believed that the damage will reach $50,000. The insurance was $25,000.

Harrington O. Thompson, Chas. T. Fasberry, Amos Hutton, and Ben Broughton have obtained a charter as the Hamilton Tool Co., Ltd., with $40,000 capital and head office at Hamilton, Ont.

The Standard Chain Co., Ltd., Walkerville, Ont., $50,000 capital, has been incorporated by John C. Schmidt, Robert Garland, Arthur E. Crockett, R. S. Mann, and Herman P. Meckley.

The Jones Safety Device Co., Ltd., has been chartered by Willie R. Ward, Vincent W. Raven, Chas. W. Readman, and others, to manufacture machinery, etc., at Hamilton, Ont., with $50,000 capital.

Wm. K. Cameron, James A. Moore, Albert E. Ponsford, Joseph A. Kilpatrick, and a large number of others of St. Thomas, Ont., have been incorporated as the St. Thomas Car Co., Ltd., with a capital of $400,000.

IRON OPERATIONS IN THE SALISBURY DISTRICT.

By early fall the Salisbury Steel & Iron Co., with offices at Utica, N. Y., will have completed the extensive improvements on which it has been engaged during the summer in Herkimer county, New York, and will be ready to ship both magnetic iron ores and concentrates. By July 20 the company hopes to have in operation a line of railway to its workings, as it has practically completed a six mile line from the mines to Dolgeville, where connections are made with the Little Falls & Dolgeville, recently purchased by the New York Central. The new line will handle both iron ore and timber. The Salisbury company is also erecting a 500-ton concentrating plant for treating its lower grade ores. This was designed by the Traylor Engineering Co., New York, and will be electrically driven throughout. It will be ready for operation early in September. In regard to the future of the Salisbury district, an official of this company says: "There is no question that within the next few years it will be the scene of very extensive mining operations. The ore formation has been traced for six miles, and the engineers and geologists concur in the belief that as good a grade of ore will be found throughout the range as we have on our property on the western end of same. The ore is a high grade magnetite, carrying from 60 to 66 per cent metallic iron, reasonably low in sulphur and phosphorus (which diminishes with depth) and entirely free from titanium." The mining operations are in charge of Capt. Henry Jewell as superintendent. The company owns some 850 acres, which it has been developing for about two years.

The Norwich Nickel & Brass Co., Norwich, Conn, has increased its capital stock from $80,000 to $125,000. The funds drived from this increase are to be used for enlargement of plant.

RUSSIAN IRON INDUSTRY.

Output of Ore Restricted in Order to Market Overproduction.

Consul Alexander Heingartner writes from Riga that notwithstanding the depression in the Russian iron industry, the extraction of the southern hematite ores continues to increase. He adds:

This is due to the rapid growth in the export of these ores to Silesia and Westphalia, which rose from 220,000 tons in 1905, to 460,000 tons in 1906, which was about 10 per cent of the output. In view of the small available quantity of these ores, estimated at only 66,000,000 tons, this increase in the export is causing some anxiety to the local mill owners, as the other ores of the district are of poorer quality and less importance, the output having decreased from 180,000 tons in 1899 to 28,000 tons in 1906. The peninsula of Kertch, on the other hand, possesses valuable deposits of the metal, estimated at 466,000,000 tons, but owing to the backward condition of the industry in this region the yearly amount of ore smelted is not above 250,000 tons. The mines of the Ural, where the largest deposits of the ore are to be found in the Empire, have been forced to restrict their output. It is hoped to extend the market for these ores to the south, and by a reduction in freight rates and a more thorough utilizing of the inland waterways, to lay down the ore at the Don foundries for about $3.84 per ton, a price only slightly higher than the local hematite ores. If the south can obtain the Ural ores at that figure the future of its iron industry is assured, and the local mill owners can view the export of their hematite ores to Germany with indifference.

Production of Pig Iron.

In the manufacture of pig iron there has been since 1900 a certain displacement in the local production, as appears from the following table:

Country.	1900. Tons.	1905. Tons.	Capacity of mills. Tons.
South Russia...	1,477,600	1,656,800	2,730,000
Ural	811,000	660,000	996,000
Central Russia.	230,000	84,375	385,000
North Russia...	35,680	12,700	56,250
Poland	293,460	246,700	562,500
Total	2,847,740	2,660,575	4,729,750

The capacity of the Russian iron mills is much larger than the present output and the limit will not have been reached, even should the present imports of machinery (in 1905 7,624,000 poods, the equivalent of 137,232 tons of pig) be replaced by the domestic article and the per capita consumption of iron in Russia increase to that of Austria and Sweden. The import of pig iron, which has already decreased to 5 per cent of the total production, will no doubt cease entirely in the near future. The prices of pig iron at the most important markets of south and north Russia for the years 1904-6 were about equivalent to the prices abroad. With a reduction of $1.60 per ton in the present cost of production (about $12.50 to $12.80 per ton), which is considered possible with a more up-to-date equipment of the mills and improved processes in manufacture, it is expected that Russian pig iron will soon become an article of export.

Manufacture of Products.

Rails are manufactured in four districts, the south leading with a production in 1905 of 290,000 tons out of a total of 373,180 tons. The southern mills are also best equipped for this specialty, requiring only 1.062 tons Bessemer ingots per ton of rails. With pig iron costing $12.50 per ton, the cost of production in the more modern mills is about $19.85 to $20.85; in the others about $24.40. In the smaller rolling mills of the Ural the cost approximates $27.25, owing to the large amount of manual labor employed in manufacture and the greater quantity of raw material used, viz., 1.406 tons per ton of rails.

As the yearly requirements of the Russian railroads, with a length of 60,000 versts (40,000 miles), are about 257,140 tons rails, and the capacity of the mills 707,140 tons, not only can Russia supply its own home demand, but also furnish a large quantity for export. To gain the foreign markets, however, the mills will have to reduce the price at least $1.90 per ton below that of the international rail syndicate. Of structural shapes of all kinds there were produced in 1905 1,176,000 tons, the bulk of the production, or two-thirds, falling to the south. Of iron and steel plates and sheets, the south is the largest producer, with an output of 126,640 tons out of a total of 230,460 tons. The capacity of the mills is 530,350 tons, exclusive of roofing plates. The demand for boiler plates exceeds the supply, and a small quantity, 8,840 tons, was imported in 1905.

Roofing plates are also manufactured in all districts, although the Ural is the largest producer, with an output of 175,180 tons out of a total of 213,260 tons. Formerly the Ural had a monopoly of this manufacture, supplying even foreign markets with the article, and should the Russian mills modernize their processes a revival of this export is considered quite possible. The district still holds a dominant position in the Russian markets.

REORGANIZATION PLAN

For National Wire Corporation Fails to Materialize.—Plants Merge.—New England Notes.

(Special Correspondence.)

Worcester, Mass., July 8.—All hopes of a reorganization of the National Wire Corporation having fallen through, the concern has been petitioned into bankruptcy and pending bankruptcy proceedings, it is the intention to have the federal court place the corporation in the hands of receivers. Temporary receivers have also been asked for the parent concern, the National Steel & Wire Co., which is also in bankruptcy.

Negotiations have been completed for the merging of the Phoenix Iron Works Corporation and the Fenn Machine Co., both of Hartford. The new corporation will be known as the Taylor & Fenn Co., with capital stock of $100,000. The officers are: Edward D. Redfield, president; Charles L. Taylor, treasurer; J. H. K. Davis, secretary, and W. L. Fenn, manager. The merged concern will be concentrated in the plant now occupied by the Phoenix Iron Works Corporation which will be much enlarged. The Fenn Machine Co., manufactures automatic screw slotters, drill presses and special machinery and the Phoenix Iron Works Corporation makes textile machines and special machinery.

A concrete chimney 220 feet high is being built for the South Works of the American Steel & Wire Co., by the Webber Steel Concrete Chimney Co., Chicago. The chimney is twelve feet in diameter at the base, with wall three feet thick, and will be ten feet across at the top. A second, or inner wall goes up ninety feet, but after that the wall is single. This chimney is to take the flues of twelve boilers, where now are used twelve chimneys. The cost will be about $7,000, as compared with $12,000 for a brick chimney. This is a new kind of chimney for New England.

Work at San Francisco.—The summary for June on the rebuilding conditions of San Francisco shows the aggregate value of buildings projected during the month as $3,916,450, and permits of the value of $73,497,842 issued since the fire. Real estate sales for the month were 625 of the value of $1,922,346. Bank clearings aggregated $177,307,227.96, against $132,149,341.46 in June, 1906, and $148,312,795.94 in June, 1905. Customs receipts for the month were $668,176.17.

GAIN SHOWN

By Net Profits of International Steam Pump Co. During Past Year.

Increased profits and surplus over the preceding year are shown by the annual report of the International Steam Pump Co. for the year ended March 31, 1907. The profit and loss account of the company is as follows:

Trading and mfg. profits (all companies)	$2,288,914
Other income, interest, etc.	256,991
Total income	$2,545,905
Interest, disc.	156,201
Depreciation	396,311
San Francisco loss	62,837
Royalties	8,543
Total	$ 623,892
Net profits for year	$1,933,013

The surplus account for the past three years compares as follows:

	1907.	1906.	1905.
Net profits	$1,922,013	$1,849,744	$1,332,933
Interest & discounts	394,889	392,149	334,499
Surplus	1,527,124	1,457,595	998,434
Preferred dividends	859,800	709,800	709,800
Balance	667,324	747,795	288,634
Common dividends	.....	.....	306,597
Surplus	667,324	747,795	*17,963
Previous surplus	1,884,382	1,276,318	1,710,500
Profit and loss surp.	$2,551,706	$2,024,113	$1,692,537

*Deficit.

Assets of $44,000,579 are shown by the general consolidated balance sheet as of March 31, 1907, compared with $36,078,072 in 1906, $34,946,937 in 1905 and $33,012,170 in 1904. President John W. Dunn, in reviewing the operations of the company for the year, says in part:

The orders booked for the year just closed amount to $13,500,000 and the orders on hand March 31, 1907, were $6,500,000, which is far in excess of any other year in the history of our company.

All of our companies show a substantial increase in orders taken, and there is a steadily growing demand for the products of our various companies, such as water works engines, air compressors, condensers, water meters, centrifugal pumps, etc., and the orders for our standard duplex pumps show satisfactory gains from year to year.

The amount spent for improvements and additions during the past year represents such new machine tools and improved equipments as were necessary to keep up the efficiency of our various factories. There has been deducted from our profits $396,311.32 to cover depreciation on buildings, machinery, tools, patterns, drawings, fixtures, etc.

The Worthington Pump Co., Ltd., of London, reports the best year since the organization of the company. The sales were largely increased and the results of the year's operations were very gratifying. Our foreign house reports a decided improvement in business conditions, with prospects for another good year.

Notwithstanding the increase in the price of labor and the large advance in the cost of raw material, the operations of the year just closed show very satisfactory returns. The work of concentrating our product in the shops equipped for special lines has been vigorously prosecuted, thereby increasing the amount and economy of the production. Our sales department is well organized and our companies are efficiently represented, not only throughout the United States, but in the foreign countries as well.

With a large amount of orders on our books, taken on estimates based on advanced prices of labor and material, and with the factories equipped to turn out a large production at a minimum cost and with the increasing demand for our products, we have every reason to look forward to the coming year in confident anticipation of increased profits over the past.

GOVERNMENT FIGURES ON IRON AND STEEL INDUSTRY.

The census bureau of the national government has just issued a belated bulletin on the statistics of the iron and steel industry of the country for the year 1905. Most of the information therein contained has already been covered in the reports made public by the American Iron and Steel Association, but there are some interesting facts to be gleaned from the government figures. The number of iron and steel establishments in 1905 is shown to have been 606, capitalized at $948,689,640, with an average number of 242,740 employes earning $141,439,906 in wages. The cost of material used was $620,171,881; the value of products $905,854,152, and the tonnage produced 84,844,933. In 1905 there were 191 blast furnaces with invested capital of $239,559,194, using materials costing $178,967,449 and producing 16,628,294 tons of pig iron. Of the total output Bessemer iron constituted 8,894,584 tons; basic iron, 2,553,940 tons; foundry iron, 2,679,243 tons, none of the remaining grades forming as much as 4 per cent of the total. The report shows 415 active steel works and rolling mills in 1905, with a capital of $709,130,646. The average number of wage earners and their wages were respectively 207,562 and $122,491,993; the materials used cost $441,204,432; the products were valued at $673,965,026, and the tonnage turned out was 18,216,639, of which 13,670,592 was steel, divided into 57 per cent Bessemer, 37.1 per cent basic open-hearth and 5.5 per cent acid open-hearth. The quantity and value of direct castings made were 291,509 tons and $20,947,400 respectively. Of the 36 active tin and terne dipping establishments in 1905, three-fourths were equipped for the manufacture of black plates. The active plants had a capital of $10,891,239; an average number of 4,847 employes earning $2,383,070 and produced finished material to the value of $35,283,360.

NEW ROLLING MILL.

The Cincinnati Iron & Steel Co., a preliminary company, has been incorporated under the laws of Ohio, with a capital of $10,000. The interests behind the new company are the same as now conduct the business of the Cincinnati Iron Store Co. Plans are on foot to build an iron and steel rolling mill with a capacity of about 3,000 tons per month, on the line of the C. H. & D. R. R. between Cincinnati and Hamilton, O. There are contemplated a 9-inch and a 16-inch bar mill and an 18-inch muck mill. The capital of the company will be increased later to finance the building of the plant. It is understood that when the enterprise is completed the business of the Cincinnati Iron Store Co. will be merged into the Cincinnati Iron & Steel Co. and the two concerns will be operated together. The furnace of the Hamilton Iron & Steel Co. which is being built at Hamilton furnishes a convenient place to obtain pig iron and the Andrews Steel mill, which is under construction in Newport, Ky., offers a supply of steel at short range. It is estimated that it will cost about $500,000 to build and equip the new plant. Edward H. Busch, president of the Cincinnati Iron Store Co., will be the head of the new company, and James I. Stephenson, J. A. Sabastiana, and J. J. Bering are also interested.

Export Rates Raised. — Export freight rates on every form of manufactured steel and iron were advanced one cent per 100 pounds in trunk line territory July 1. Domestic rates on iron and steel products in this territory were raised 1½ cent per 100 pounds on June 1.

The Republic Belting & Supply Co., Cleveland, is sending out an interesting souvenir in the shape of a calculator for figuring horsepower. The souvenir will be sent to anyone interested in power transmission upon application.

The Lake Erie Nail & Supply Co., Cleveland, announces that it has added to the line of supplies handled by it the Gilbert wood split pulley, manufactured by the Saginaw Mfg. Co., Saginaw, Mich. These are manufactured in a number of different styles and with a large range of sizes.

STEADY PROGRESS

Of the Northwestern Malleable Iron Co.—Smooth and Prosperous Career.

To commemorate its 25th anniversary, the Northwestern Malleable Iron Co., Milwaukee, has issued a handsomely illustrated 20-page brochure, which briefly sketches the career of this concern from its inception to the present day. The historian states that the company's life has been a smooth and uneventful one, as it has experienced no bad fires, no serious strikes and no disaster of any kind. Instead, it has enjoyed a steady yearly development, without interruption, for a quarter of a century. The firm was established June 27, 1882, and was known as Elmore, Sivyer & Co., Eltinge Elmore, Frederick W. Sivyer and William A. Draves being the organizers. Operations were commenced with a small cupola, one annealing oven, and a modest building to house the entire shop, while a little cottage served as an office. The working force consisted of 25 men and although the capacity claimed was 600 tons per annum, it was some time before that production was reached. Shortly after the business was organized, Mr. Elmore retired, selling his interest to Helmus M. Wells. The first work which came into the shop was light and plain, but before many months contracts were made with several agricultural implement manufacturers. For producing this class of material, the cupola was found inadequate and in 1883 was supplanted by a small reverberatory furnace. On May 15, 1883, the firm name was changed from Elmore, Sivyer & Co., to the Northwestern Malleable Iron Co.

Articles of incorporation were filed Sept. 8, 1888, Mr. Sivyer becoming president, Mr. Draves vice president, and Mr. Wells secretary and treasurer. In the meantime the output had practically doubled and another furnace was added to provide facilities for the constantly growing demands. Wr. Wells died Jan. 20, 1890, and on July 23, 1894, O. L. Hollister was elected secretary. John M. Potter was elected treasurer in July, 1896, having become affiliated with the concern shortly after the death of Mr. Wells.

After ten years of growth, the annual sales were increased six-fold, and the capacity from 600 tons per year to 5,000. The number of employes was increased to 600. On July 1, 1902, Mr. Hollister resigned to become associated with the West Allis Malleable Iron & Chain Belt Co., of which concern he is now president. Frederick L. Sivyer, son of Frederick W. Sivyer, succeeded to the office of secretary, and at the same time was elected superintendent, succeeding Mr. Draves, who continued as vice president until his death in March, 1906. On April 16 of this year, D. Ralph Day was elected secretary and the eldest son of the company's first secretary, Helmus B. Wells, was elected second vice president. With a view to keeping the plant abreast of the times, many additions have been made and old shops rebuilt. A new four-story office building was completed about a year ago, as well as a pattern storage vault, carpenter shop, lumber store room, and a well-lighted and completely-equipped metal pattern and machine shop.

At the end of 25 years, the company's capacity has increased from 600 to 30,000 tons and the small cupola, with which operations were begun, has been replaced by eleven reverberatory furnaces which are housed in six separate buildings. In addition to the furnaces, a 10-ton cupola is used for casting annealing pots, and 15 annealing ovens are required for the castings produced daily. In the last quarter of a century, the historian states that there have been few radical changes in the malleable foundry practice. The style of the furnace, the method of melting and the process of annealing have remained practically the same in that period. The most noteworthy innovation was the introduction of the chemist and this concern was among the first of the manufacturers of malleable castings to build and equip a laboratory. The introduction of molding machines has greatly facilitated the making of molds and a large number of squeezers and many machines are in use in this plant. The working force has grown to 1,200 and the labor cost of this large malleable plant is at the rate of $200 per working hour. During the 25 years of its activity, the Milwaukee laboring men have been paid over $5,000,000. The company's sales during the past fiscal year have reached a total of $1,500,000, five times greater than the total ten years ago. The amount of contracts closed in March, 1907, was greater than that of any year up to 1890.

The Joseph Wharton interests are preparing to reopen the Orchard mine, a New Jersey property which has not been operated for a number of years.

PENNSYLVANIA SYSTEM HAS FEW DEFECTIVE RAILS.

Commenting upon the agitation now under way between the manufacturers and the railroads relative to the possible improvement of the steel rail, A. C. Shand, chief engineer of the Pennsylvania system, declares that the circulated reports of the many rail breakages on American lines do in this discussion Mr. Shand says:

"During the year 1901 there were removed from main running tracks on the Pennsylvania east of Pittsburg and Erie 675 defective rails, a very large portion of these, however, were not broken, but were rails that were not properly holding up under the traffic and were what is commonly known as "mashing" on account of the loads passing over them. This represents 46.6 rails removed from tracks on account of defects for every 1,000,000,000 tons of freight moved one mile. In the year 1905 there were removed 1,747 defective rails, or 90 rails per 1,000,000,000 tons moved one mile. Not one-tenth of these rails was broken. During the year 1901 there was a total tonnage over the Pennsylvania railroad east of Pittsburg and Erie of 14,475,000,000 tons, and during 1905 there was a tonnage of 19,387,500,000 tons, an increase of 34 per cent, the passenger train mileage also increasing during the same period 29 per cent.

"It will, therefore, be seen that the Pennsylvania has little cause for complaint on account of defective rails—in fact, it is remarkable that such an enormous tonnage, with such a large portion of steel cars loaded to maximum of 110,000 pounds, in addition to the weight of 40,000 pounds of the car itself, can be carried so safely and with such a small proportion of defective rails.

"It is true that the officials of the Pennsylvania have, like all other roads, done their best to insist on a better quality of rail, and will continue to do so, but that is more from a standpoint of getting the very best that can be secured for the money.

"It is also a fact that during the last 25 years there has hardly been a single accident to a passenger train which could be attributed to defective or broken rails on the Pennsylvania between New York and Pittsburg.

"This would clearly indicate that the company is exercising a very close supervision over the maintenance of its various lines, and the traveling public may not feel in any way alarmed for exaggerated reports."

Stocks Rise Despite Limited Trading

With almost no exception, steel stocks and leading industrials gained in strength during the past week despite a comparative small volume of business transactions, contributed to in part by the holiday cessation of the Fourth. In some instances these gains were of sharp proportions, including among the leaders, Crucible Steel preferred, 5½ points; Sloss-Sheffield Steel & Iron preferred, 4½ points; Bethlehem Steel common, 3½ points; New York Air Brake, 3¼ points; United States Steel common, 3 points, preferred, 1½ points, and bonds, 1¼ points. The action of steel securities was typical of the entire market. At times the upbidding of stocks was active, but whenever there was lag, no recession was noted, although the support tendered was wholly of a professional character, the expected appearance of the public in the market for reinvestment, following the mid-year disbursement of dividends and interests, having as yet failed to materialize. The upward influence that has been apparent during the past two weeks is clearly displayed in the case of 20 active railroad stocks, which have gained an average of about six points in that period, the most encouraging example of such a movement for a considerable length of time. In a monetary way, the expected influence of the large amount of currency turned into the channels of business by the July disbursements was displayed in the improvement of call rates. Advancing on Monday to 15 per cent, the rate quickly declined and adjusted itself at a 5 per cent level at the close. The foreign situation shows no definite change. The Westinghouse Electric & Mfg. Co. during the week announced the sale of $6,000,000 6 per cent, three year notes for the purpose of taking up a like amount of 5 per cent notes falling due August 1. The New York bank statement fell far below expectations, and instead of the encouraging gain looked for, it revealed a decrease of $5,025,900 in cash. The deposits were reduced $13,491,500, against the contraction of $10,814,800 in the loans. The surplus reserve was cut $1,653,025, leaving the amount held by the banks in excess of their legal reserve requirements only $856,250, compared with $6,465,075 on the corresponding date in 1906. The five-day trading record on the New York exchange for the week was 2,311,500 shares, against 2,626,400 shares last week and 3,948,200 shares the corresponding week in 1906. The bond market remains dull and unresponsive to investment demand, sales of the week aggregating $4,449,000, against $4,635,000 last week and $9,364,000 the corresponding week in 1906.

Copper Stocks.

Boston.—Butte Coalition, closed 27½, net gain 2½; Calumet & Arizona, closed 174, net gain 8; Green-Cananea, closed 17¼, net gain 1; Quincy Mining, closed 119, net gain 3; Osceola Mining, closed 128; North Butte, closed 84⅝.

States, during the final half of 1907, according to statistics compiled by R. G. Dun & Co., were 5,607 in number, and $69,568,662 in amount of liabilities. The total assets were $42,153,278. This is the best statement as to the number of bankruptcies for the corresponding six months of any year since 1899, but the liabilities were slightly above the average. The record of the first half of 1906 showed 5,612 failures with $62,664,-

THE LEADING INDUSTRIAL SECURITIES.

	Clos'ng Quo. July 6	Changes in Week	Date 1907 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Paid	Dividend Date Last Div. Pay.
Allis-Chalmers	11⅛	+1	Sept.	19,820,000			
Allis-Chalmers pr	30⅜	+ ⅛		16,150,000	7 cum		Feb , 1904
American Can	5¾	+ ¼	Feb.	41.233.300			
Am. Can pr	55	+ ¾		41,233,300	7 cum	5 Q.	Apr., 1907
Am. Car and Fdy	44⅝	+1⅛	June 27	30,000,000		2 Q.	Apr., 1907
Am. Car and Fdy pr	100⅛	−2⅛		30,000,000	7 n. c.	7 Q.	Apr., 1907
American Loc	5 ⅛	+ ⅛	Oct. 5	25,000.000		1¾ Q.	May, 1907
American Loc. pr	104½	− ⅛		24,100,000	7 cum	1¾ Q.	Apr., 1907
American Ship	77¾	.....	Oct. 2	7 600,000	6	1 Q.	June, 1907
American Ship pr	105	.....		7.900,000	7 n. c.	1¾ Q.	Jan , 1907
Am. Steel Foundries	7½	.....	Oct. 1	15,810,000			
Am. Steel Foundries pr	37⅜	+ ⅜		17.240,000	6 cum		Aug., 1904
Barney & Smith	65	.....	June 4	2,000,000	4	1 Q.	June, 1907
Barney & Smith pr	128½	.....		2,500 000	8 cum	2 Q.	June, 1907
Bethlehem Steel	14½	+3½	April 2	14.862,000			
Bethlehem Steel pr	40	.....		14,90*,000	7 n c.	1¾ Q.	May, 1907
Cambria Steel	38⅝	+ ⅜	March 19	45,000,000*	6	3 Q.	Feb., 1907
Cambria Iron	47¼	.....		8,468.000*	4	4 S. A.	Apr., 1907
Chicago Pneumatic Tool	41	.....	Feb. 18	6,145 800	4	4 Q.	Apr., 1907
Colorado Fuel	33⅛	+1⅛	Oct. 21	30,132,000		....	Apr., 1902
Crucible Steel	8	+ ⅛	Oct. 16	24.578 400			
Crucible Steel pr	68½	+5½		24,436.500	7 cum	6	Mar., 1907
Empire Steel	9	.....	Feb. 27	2.281.400			
Empire Steel pr	60	.....		2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	100	.....	Feb. 19	1 000.000	6	1¾ Q.	May, 1907
Fay & Egan pr	128¼	.....		1,000 000	7 cum	1¾ Q.	May, 1907
General E'ectric	139	− ½	May 14	63 643.600	8	8 Q.	Apr., 1907
Harbison-Walker	12	+1	Jan. 21	18,000,000	6		
Harbison-Walker pr	73	.....		9.600,000	6 cum	6 Q.	Jan., 1907
International Pump	24	.....	June 4	17,762,500		2	Apr., 1905
International Pump pr	72	.....		11,350,000	6 cum	6 Q.	May, 1907
Lackawanna Steel	50	.....	March 13	34,971.400			
Lake Sup. Corp	8½	.....	Oct. 2	40,000 000			
New York Air Brake	107¾	+3¾	June 18	10,000.000	8	8 Q.	Apr., 1907
Niles-Bement-Pond	130	.....	Feb. 6	5,000,000	6	6 Q.	Mar., 1907
Niles-Bement-Pond pr	105	.....		2.000,000	6 cum	2 Q.	May, 1907
Otis Elevator Co	35	.....	March 18	6.350 300		3 A	Apr., 1907
Otis Elevator Co. pr	87	.....		6,308 500	6 n. c.	6 Q.	Apr., 1907
Penn. Steel	60	.....	May 13	10.750 000			
Penn. Steel pr	100	.....		1*,500.000	7 n. c.	3½ S. A.	May, 1907
Pittsburg Coal Co	11	.....	Feb. 11	32 000.000			Nov., 1906
Pittsburg Coal pr	51⅞	+ ¼		32,000,000	7		Apr , 1905
Pressed Stl. Car	37¼	+2	Feb. 20	12 500,000		3	Aug., 1904
Pressed Stl. Car pr	90	+1⅞		12 500 000	7 n c.	1¾ Q.	May 1907
Pullman	160	.....	Oct. 17	100,000 000	8	2 Q.	May, 1907
Railway Stl. Spring	42¾	+ ⅛	March 7	13 500,000		4 S. A.	Mar., 1907
Railway Stl. Spring pr.	80	− ⅛		13,500,000	7 cum	1¾ Q.	June, 1907
Rep. Iron & Steel	29⅞	+2⅞	Oct. 9	27.191,000			
Rep. Iron & Steel pr	84	+1⅛		20,416.100	7 cum	1¾ Q.	July, 1907
Sloss-Sheffield	54	+1	March 5	10,000,000	5	1 Q	June, 1907
Sloss-Sheffield pr	97	+4⅛		6 700,000	7 n. c.	1¾ Q.	July, 1907
Tenn. Coal & Iron	142	+1½	May 7	22.553 060	4	4 Q.	May, 1907
U. S. Pipe & Fdy	35⅞	+ ⅞	June 26	12 500.000	4	1 Q.	June, 1907
U. S. Pipe & Fdy. pr	80	+ ½		12 500 000	7 n. c.	1¾ Q.	June 1907
U. S. Steel	38⅞	+3	April 15	508,302 500	2 n. c.	½ Q.	July, 1907
U. S. Steel pr	100¾	+1½		360.281,100	7 cum	1¾ Q.	June, 1907
U. S. Steel 5's	97	+1¼		463.798 000	5	5 A.	
Va. Iron, Coal & Coke	66	+1	Sept. 17	8,641,600			
Westinghouse Elec	143½	−1½	July 24	24 928.700*	10	10 Q.	Apr , 1907
Westinghouse Air Brake	146	- 2	Oct. 1	11,000,000*		22½ Q.	Jan., 1907

Par value of shares, $100, except those starred (*), $50.

New York.—Amalgamated Copper, elected.

Financial Notes.

The Hall Signal Co. has declared a dividend of 1 per cent and ¼ per cent extra on the common stock. At the annual meeting held in Augusta, Me., the retiring board of directors was re-elected.

Commercial failures in the United

074 in liabilities and $32,802,020 in assets.

William T. Carroll, a noted inventor of Worcester, Mass., celebrated his eighty-eighth birthday last week. Twelve years ago he invented an oil-less bearing for spinning machines and has taken out during his life about 48 patents.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Akron File Co., Akron, O., has been chartered with a capital of $25,000 by Frank Nolte and others.

The Acme Machine Co., Delphi, Ind., has filed articles of incorporation with a capital of $5,000. Those interested are: I. Dreifus, J. J. Schultz, and E. E. Kirkpatrick.

The National Folding Machine Co., Sidney, O., has been organized with a capitalization of $20,000 by Fred J. Sage, Achilles Ackerman, D. S. Woolley, Jasper N. Nut, and Warner Boos.

With a capital of $50,000 the Main Automatic Mailing Machine Co., Columbus, O., has been incorporated by F. R. Main, C. H. Switzer, M. A. Corbett, Curtis Main, and C. W. Dralce.

The Freebenard Co., Joliet, Ill., has been chartered with an authorized capital of $21,000 to manufacture hydraulic appliances. Those interested are: Charles E. Finley, Fred Bennett, and C. W. Brown.

The United Store Service & Tube Co., Portland, Me., machinery, has been incorporated with a capital of $300,000. The officers of the company are: President, J. E. Manter; treasurer, C. E. Eaton; clerk, M. W. Baldwin, all of Portland.

Articles of incorporation have been filed by the Sycamore Fence Co., Sycamore, Ill., to manufacture wire fencing. The capital stock of the company is $100,000, and the incorporators are: Marshall C. Munn, A. R. Younggren and John L. Storey.

The Mallory-Maschke Co., 123 Liberty street, New York, has been organized by S. W. Mallory, William O. Maschke, and J. Higgs. The company will manufacture steam specialties, such as tube blowers, indicator reducing wheels, soot suckers, etc.

The Bushnell Tank & Fence Works, Bushnell, Ill., capital $75,000, has been chartered under the name of the Bushnell Tank Works, to manufacture wood and steel tanks, combination fence, etc. No change of ownership is involved in the reorganization.

The Chase Motor Truck Co., Syracuse, N. Y., has filed articles of incorporation with a capital of $40,000. The incorporators are: Aurin M. Chase, Hiram P. Bellinger, and Austin C. Chase, all of the above address. The company will manufacture cars, trucks, boats, motors, engines, etc.

The Ramsey-Smith Co., Youngstown, O., with a capitalization of $10,000, has been organized by S. W. Ramsey, Guy W. Smith, R. F. Ramsey, Samuel E. Pratt, and William H. Lewis. The company proposes to convert flue dust from blast furnaces into ore bricks, in addition to manufacturing other products from furnace waste.

The Cleveland Chain & Mfg. Co., Cleveland, has been formed by Louis D. Round, Louis D. Cull, Hannah Round, Albert Stanner and David D. Round. The capital stock of the company is $20,000. The company has acquired a tract of 14 acres along the Pennsylvania lines at Whitehouse crossing, and will erect a plant for the manufacture of chains. The details of the construction have not yet been worked out.

The Ford Pump & Engine Co., with head offices at Spokane, Wash., has been organized with a capital of $100,000 to manufacture a rotary engine and pump for irrigation purposes. The company is contemplating the erection of a plant in Spokane to supply the irrigating districts in the northwest. The officers of the company are: A. F. Ford, president; J. B. Ferguson, vice president; B. L. Youngs, secretary and treasurer. These officers, with T. E. Henderson, form the board of directors.

New Construction:—

The Corlett Engineering Co., Cleveland, has awarded the general contract to Henry G. Slatmyer for the construction of the plant of the Standard Welding Co. to be erected in that city.

The Thomas Carlin's Sons Co., Allegheny, Pa., manufacturer of engines, oilers, and heavy machinery, is now rebuilding and improving the buildings which were recently damaged by fire.

Announcement is made that the Jones-Ankeny Co., Spokane, Wash., will soon erect a plant for the manufacture of implements at Walla Walla, Wash. The plant will turn out a new weeder invented by A. A. Fehrbach.

The Wallace Machinery Co., Champaign, Ill., is expecting to erect a plant this fall to increase its facilities for manufacturing the Wallace power sprayers, for which it reports an active demand.

The Danielson Plow Co., Joplin, Mo., has broken ground for a new plant at Independence, Mo. The first building to be erected will be 100 x 260 feet of steel and brick. It is expected to construct a second building of the same size at a later date.

The North American Steel Co., Belington, W. Va., has practically completed its open-hearth building and will start immediately upon the construction of a 30-ton open-hearth furnace. A modern bar mill equipped with electrically operated tilting tables and rolls will be built. Its capacity will be 300 tons per day.

The R. & H. Mfg. Co., Box 105 Montello station, Brockton, Mass., which was recently organized, is planning to equip a plant for the manufacture of a special line of machinery. The company will require about six each of turret lathes, screw and automatic screw machines, either new or second-hand.

The Stearns Co., Erie, Pa., recently incorporated, plans to build a full line of modern saw mill machinery, including the erection of all equipment that enters into a modern mill of its kind. The officers are: F. F. Curtze, president; J. Walton, vice president; G. I. Swabb, secretary, and A. A. Claus, treasurer.

The Rock Island Stove Co., Rock Island, Ill., has just completed improvements to its plant which greatly increase its capacity. The brick mounting room building has been raised from one story to three stories, providing more space for mounting work and for the nickel shop, polishing shop and plating room. The recent fire which visited its plant did not produce serious damage.

Ballinger & Perrott, architects and engineers, Philadelphia, have prepared plans for a large machine shop to be erected for Edgar P. Earle at Stenton avenue and Louden street, Chestnut Hill. The building will be two stories, 70 x 179 feet. The same firm has also prepared plans for a one-story brick addition, 22 x 32 feet, to the foundry of the Bernstein Mfg. Co. at Third and Westmoreland streets, Philadelphia.

The American Brake Shoe & Foundry Co. has awarded the contract for the new plant which it will build at Chattanooga, Tenn., and work is now progressing favorably. The plant, which will be constructed of brick, steel and frame, consists of a main foundry building, machine shop, core room, office building, sand sheds, storage bins and shipping platform. The main foundry building will be 100 x 350 feet, and the machine shop 40 x 60 feet.

The Fort Pitt Malleable Iron Co., Pittsburg, is making extensive additions to its plant at McKees Rocks, Pa. These include a 100-foot extension to the main foundry building, and a 180-foot extension at one side of the same building, and there are under consideration plans for further extension of 100 feet. The company is putting in a new 150 horsepower Babcock & Wilcox boiler and a 150 horsepower Corliss engine to furnish power for the new additions and handle the increased output of the company.

The new plant of the Progressive Stove & Furnace Co., Colorado City, Colo., is rapidly nearing completion, and operations are expected to begin about Aug. 1. The main building is 60 x 100 feet, the molding room 60 x 60 feet, and the display room contains 2,200 square feet of floor space. The officers of the company are: John T. Murray, president; C. W. Cunningham, vice president and manager; Joseph P. Jackson, secretary and treasurer; D. C. McCracken, R. E. Johnson, I. A. Foote, and I. S. Nichols, directors.

The Safety Meter Lock Co., Columbus, O., is making a specialty of custom work and is devoting itself to the production of high-class castings for special purposes. The company will extend this plan of operation to a modern and up-to-date brass foundry which it is about to install. The equipment has not yet been contracted for, but it will be most modern in every respect. The foundry will have an initial capacity of 1½ tons of castings per day. The company is also planning an extension of its machine shop, which when completed will give it a shop practically 250 feet in length. Additional high grade equipment will be installed. The control of several patents has recently been secured by the company and these articles will be manufactured and placed on the market. F. J. Macklin is president.

The Chicago Malleable Castings Co., West Pullman, Chicago, will erect immediately a new brick building 75 x 250 feet, to be used entirely for the manufacture of cores. Considerable attention has been given to plans which will insure light and ventilation as well as the arrangement for the economical handling of materials. Convenient side tracks will permit the unloading of sand, resin, etc., directly into storage bins. The materials will then be put through mixing machinery, and from this section passed on to the core makers. The finished cores are then taken to the several small and large ovens, suitable for the required size of the core, and when baked placed on cooling racks. At this point they are inspected, counted and handed to the molders. The new building will be placed in the center of a group of molding departments, making it easily accessible and avoiding the usual long haul to the molders' benches. The order for sand-mixing machinery has not yet been placed.

The Berlin Machine Works, Ltd., Hamilton, Ont., has well under way its new wood-working plant which it is erecting in that city. The machine shop is of brick and steel construction with saw tooth roof, 200 x 308 feet, with two crane bays the full length. The foundry is 72 x 200 feet of the same construction. A power house and pattern storage are also being erected, and, when these are completed, a large office building will be put up. The site of the plant is at the intersection of the T. H. & B., Canadian Pacific and Grand Trunk railways, giving access to all the railroads in Canada. At this plant, a line of wood-working machinery of the same design manufactured by the Berlin Machine Works, Beloit, Wis., will be built. It is understood that all orders have been placed for machine shop equipment with the exception of the foundry, and the company will soon be in the market for a complete equipment of machine shop and foundry supplies. In this connection it would like to receive catalogs from the various Canadian and United States manufacturers in that line. An office has been established at 402 Bank of Hamilton building, Hamilton, Ont.

General Industrial Notes:—

The capital of the Cincinnati Shaper Co., Cincinnati, is now $400,000.

The French Oil Mill Machinery Co., Piqua, O., has increased its capital from $87,000 to $172,000.

An increase from $50,000 to $70,000 has been made in the capital stock of the Bates Forge Co., Indianapolis.

The Petroleum Iron Works Co. is bending its efforts in the completion of its new plant at Petroleum, O., and if the expected progress is maintained in the work, the plant will be partially in operation about Aug. 1.

At a meeting of the creditors of the Rockwell Engineering Co., held at the office, 26 Cortlandt street, New York, July 2, it was resolved to extend for one year, or until June 27, 1908, the agreement now in force between the company and its creditors.

The Lyons Bros. Boiler Co., Chicago, has purchased the boiler manufacturing plant and foundry, including the equipment formerly owned by the De Pere Boiler & Iron Works, De Pere, Wis. The purchaser will operate the plant for the manufacture of its patent boilers.

The Champion Machinery Co., Joliet, Ill., has begun operations in the new foundry which it has just erected. The foundry is equipped with up-to-date mechanical devices. The officers of the company are: Phil F. Carroll, president; John Kiep, vice president, and R. Oliver, secretary and treasurer.

The McConnell Engineering & Machinery Co., Tacoma, Wash., recently incorporated, will continue as a foundry and machine company the business heretofore carried on by the Puget Sound Dry Dock & Machine Co. The company will make a specialty of iron, bronze, and brass castings, marine and stationary engines and saw mill machinery.

The Iron City Coal & Coke Co., Pittsburg, has purchased the plant of the H. R. Sackett Coal & Coke Co., Uniontown, Pa., consisting of 30 ovens, 30 to 40 acres of coal land, coke crushers, and surface and everything connected with the Sackett coke plant. The plant will be known in the future as the Iron City Coal & Coke Co.'s Dorthea works.

At a meeting of the Standard Brass Mfg. Co., Utica, N. Y., the following directors were named: Theodore G. Ward, Tarrytown; C. L. Stocking, and W. H. Owen, Utica. Subsequently the directors elected the following officers: President and treasurer, Theodore G. Ward; vice president, William H. Owen; secretary and general manager, C. L. Stocking.

The Florida Iron & Wood Works, Apopka, Fla., manufacturer of saw and box mill machinery, will increase its facilities for its saw mill and general repair business. No additional buildings will be required, as the company has a large area of floor space, now being used as warerooms, etc., which it will utilize for active operations. An elevator and a new engine will be installed.

The Shelby Foundry Co., Shelby, O., has just completed a large extension to its buildings and additions to its equipment which have increased its capacity over 100 per cent. The company is making a specialty of custom work, particularly machined gray iron castings, and is prepared to handle work up to 10 tons. The plant at present has a capacity of turning out 25 tons of finished castings daily.

At the annual meeting of the Fulton Machine & Vise Co., Lowville, N. Y., the following were elected direc-

tors for the ensuing year: C. Fred Boshart, James Nefsey, M. A. Stoddard, A. R. Gebbie, A. S. Stoddard, C. D. Moore, and E. W. Fulton. The board of directors elected A S. Stoddard, president; C. Fred Boshart, vice president; and E. W. Fulton, secretary and treasurer. It was decided to increase the capital stock to $50,000.

The Smyser-Royer Co., recently incorporated, has purchased the Variety Iron Works, York, Pa., formerly owned by the E. G. Smyser's Sons' Co. It is the intention of the new company to increase the output of the plant and to do a more extended ornamental and architectural wrought and cast iron business. The officers of the company are: B. Frank Royer, president; William A. Myers, vice president and treasurer, and William H. Myers, secretary.

The Lewis Motor & Crane Co., Elmira, N. Y., recently organized, is manufacturing a water-proof electric motor for cranes, mining uses, and particularly artificial ice plants. It is expected to take up the manufacture of electric brakes, and later cable ways, elevator motors, etc., will be added. For the present the manufacturing is being done under contract, and this will continue until the company finds a location. The officers are: E. D. Lewis, president and general manager; A. F. Dense, vice president and superintendent; V. L. Fishler, secretary and treasurer. The main office is in the Lyceum building, Elmira.

The Worden Tool Co., Cleveland, manufacturer of machine knives, has increased its capital stock from $30,000 to $60,000. This step has been taken in connection with the erection of a new plant by the company on Scranton road, into which it removed recently from its former location on Columbus road. The company controls a site of 120 x 327 feet, upon which it has erected a machine shop 40 x 60 feet, grinding room 40 x 200 feet, forge shop 40 x 85 feet, tempering room 30 x 30 feet and a two-story office and shipping room 40 x 40. The company has also had erected adjoining its buildings a plant 87 x 120 feet for the Sweet Box Co.

Trade Notes:—

Dodge & Day, engineers, Philadelphia, announce that they will open an office at 115 Broadway, New York, under the management of Robert T. Lozier.

Ph. Bonvillain & E. Ronceray, manufacturers of molding machines, have established an American branch at 1315 Race street, Philadelphia, for the purpose of demonstrating the utility of their machines, which are shown in operation.

Colne & Co., successors to Powell & Colne, 11 Broadway, New York, have just closed the fourth contract with the United States government for the installation of a steel casting equipment by the Tropenas converter steel process at the Mare Island navy yard, California. The firm has to date erected 32 converters.

The Norton Co., Worcester, Mass., at its new store 48 South Canal street, Chicago, is carrying a line of Norton machines for cylindrical grinding, universal tool and cutter grinders, bench and floor grinders, etc., manufactured by the company, as well as alundum grinding wheels and other abrasive products. George A. Stone is in charge of the store.

William Swindell & Bros., German National Bank building, Pittsburg, are erecting crucible steel melting furnaces for the Simonds Mfg. Co., Chicago; Burgess & Dickinson, Dunkirk, N. Y.; Lundum Steel & Spring Co., Watervliet, N. Y., and the Collins Co., Collinsville, Conn., for whom they are building five heating furnaces and one large converting furnace. The company is also erecting a number of sheet and pair furnaces, gas producers and five regenerative annealing furnaces for the La Belle Iron Works, Steubenville, O., in addition to a number of gas producers at Sharon, Pa.; Bridgeport, O., and Winchester, Ind., regenerative heating furnaces and annealing furnaces for the Crescent plant of the Crucible Steel Co. of America, and one 20-ton air furnace for the roll and machine works of the American Sheet & Tin Plate Co. at Canton, Pa. There has just been completed by the firm two basic open-hearth and regenerative heating furnaces for the West Leechburg Steel Co., one 20-ton open-hearth furnace for the Lorain Steel Co., Johnstown, Pa., one 20-ton open-hearth furnace for the Pratt & Letchworth Co., Buffalo, N. Y., and one 25-ton open-hearth furnace with gas producers for the Harrison plant of the Crucible Steel Co. of America, Harrison, N. J.

Fires:—

The plant of the Canton Brass Co., Canton, O., suffered a heavy loss by fire June 27.

The machine shop of P. H. & A. H. Morris, Philadelphia, was damaged $40,000 by fire June 28.

The boiler plant of the Williamette Iron & Steel Works, Portland, Ore., was recently damaged by fire.

The railroad shops and round house of the Central New England railroad, Hartford, Conn., were destroyed by fire June 28. The loss is estimated at $75,000.

The steamer Batchawanna of the Ganley Line burned off Copper Mine Point, Lake Superior, June 27, the fire originating from an explosion. The Batchawanna was loaded with ore for the Algoma Steel Works.

The foundry building and pattern store house of the American Steel Foundries at Indiana Harbor, Ind., were heavily damaged by fire July 4, causing a loss estimated at $100,000.

TRADE PUBLICATIONS.

Pneumatic Tools.—The Dayton Pneumatic Tool Co., Dayton, Ohio. 6¼ x 6¼ inches. 47 pages. This catalog illustrates and describes the complete line of tools made by the Dayton Pneumatic Tool Co., including chipping and calking hammers, riveting hammers, hammers for scaling paint, sand rammers, pneumatic drills, cylinder hoists, pneumatic hold-ons, air compressors, etc. In addition to the information concerning tools listed, considerable data are presented relating to compressed air.

Lathes.—Schumacher & Boye, Cincinnati. Sheet for loose leaf catalog. 8½ x 11 inches. These sheets describe the Schumacher & Boye instantaneous change gear engine lathe, ranging in size from the 18-inch to the 48-inch triple geared lathe. Particular attention is called to the double plate apron installed on lathes of 24-inch swing and over. This double plate apron prevents overhang and straining of pinions and studs and is of the most rigid construction possible.

Mechanical Draft.—The Green Fuel Economizer Co., Matteawan, N. Y. Bulletin 108. 6 x 9 inches. 16 pages. This bulletin describes several mechanical draft fans of extraordinary size, including a pair of fans supplied to the East St. Louis & Suburban railway, said to be the largest ever built with overhung wheels, which measure 19 feet 6 inches diameter by 7 feet wide at the tips of the blades. Photographs are shown of a number of other large fan installations. A portion of the book is devoted to the Green fuel economizer and contains considerable valuable information.

The Industrial Works, Bay City, Mich., are erecting a steel foundry 135 x 270 feet, with a daily melting capacity of about 30 tons. It is understood that Carr & Speer, 120 Liberty street, are consulting engineers.